# Products finishing

FRED W. VOGEL, Editor

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ONE of the things we worried about six months ago was whether our great industries could be changed over from manufacturing the autos and gadgets and the appliances of peace to manufacture—on the same mass producton basis—the weapons of war. Today we know these industries can do just that, because many of the largest have done it and others are doing it. War Production Board Chairman Donald M. Nelson says our factories will turn out a total of about 45 billion dollars' worth of weapons and military supplies and equipment this year, and he expects that the figure will rise to 70 or 75 billions in 1943.

That last figure is truly colossal, it means production for war on a scale never before attained. It means that we are shooting the works—we have no other choice, if we wish to preserve our liberties. It means that we shall be making almost nothing for ordinary civilian uses, and it means that we must do a better job of salvage than we have been doing, because no amount of production facilities can deliver the goods unless there are materials with which to work. And scrap is an important ingredient of most materials, in 1941 half of the raw material required to make iron and steel products was iron and steel scrap. That's why WPB is pressing its new, continuing National Salvage Campaign, and that's why all of us must stay on the salvage job until we've won the war.

**AUGUST, 1942** **Vol. 6, No. 11**

# *Coating and Alloying Time for Hot-Dip Zinc Coatings*

By WALLACE G. IMHOFF

President, The Wallace G. Imhoff Company
Vineland, New Jersey

HOT-DIP Zinc Coating or Galvanizing in the past twenty years has become a very definite science. In the short span of the writer's lifetime this great industrial method of protecting iron and steel against the ravages of corrosion has passed from the "quack" stage of bags and bottles on the window sill containing "special materials," to one of definite scientific principles, and carefully controlled practical operations.

Twenty-two years ago the writer walked into a galvanizing shop with the plant president. I had been carefully posted to keep a sly eye on the galvanizing foreman, because like a "Witch Doctor," or like medium, he would for our special benefit go over to the window sill where he kept a row of jugs, bottles, and bags, which no one except himself of course was allowed to touch or know anything about, and that he would shortly take a "touch of this," and a small "handful of that," and while we were talking, he would put them on the galvanizing bath. All this was his own deep secret for which at the end of each month, there was always a special bill from the galvanizer which was labeled, "Materials Furnished by Me."

Now all this seems fantastic, and perhaps a fairy tale by the writer, but there is actual definite proof available to show that this actually did happen, and was prevalent in the galvanizing industry only twenty-two years ago. However, there was a young giant just beginning to awaken at that time, and his name was "INDUSTRIAL RESEARCH." The Mellon Institute of Industrial Research was the great pioneer that "smashed" and did away with all of the bags and bottles on the window sill, and incidentally the little racket known then as "Materials Furnished by Me" which always meant a neat little $25.00 or $50.00 extra in the pay envelope. Five years of intensive research investigations were carried on both in the laboratory and in the plant on full-sized scale, to verify the scientific principles unearthed with time, and careful research methods.

### Operations Subdivided Scientifically

One of the very first things done was to subdivide the many practical operations of galvanizing so that each

could be explored separately, while at the same time all of the other factors and components were held stationary, or standardized. Thus, by taking each operation one at a time, while at the same time holding the others stationary, many new scientific principles were discovered, and hot-dip galvanizing was taken out of the "bag and bottle stage," and reduced to a definite science.

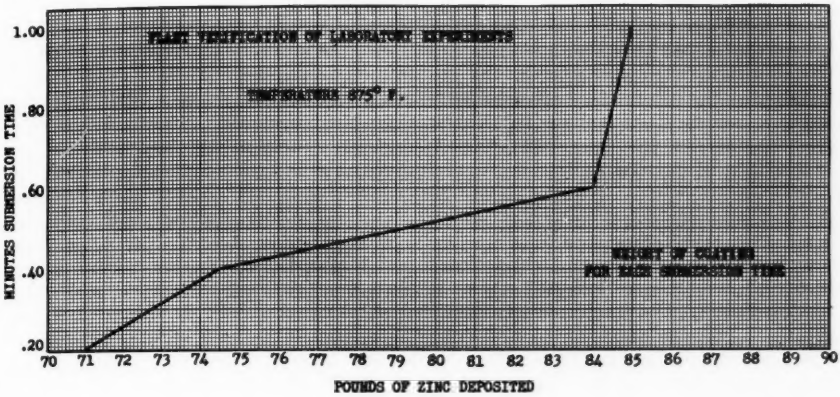


Fig. 1—Graph showing weight of zinc deposited plotted against minutes submersion time.

### Errors Reduced, or Eliminated by Large Numbers of Articles Tested

Realizing that errors are bound to creep into any research investigation, precautions were taken in two ways—first, at least 10 separate articles were tested to give just one reading or figure in the test. This figure was the average of all ten actual tests. The second sure way of establishing the scientific principle was after it had been discovered in the laboratory, it was verified in the plant on a full-size operating basis under normal operating galvanizing conditions. This not only proved the principle true, but it also established the fact that the principle could be used in practice, and actual money value be obtained from applying it. In addition to these two features, attention is called to the fact that other hidden things which were suspected to be true were actually found to be true after the other basic principles had been established.

### Practical Operations

The practical man in the shop does many things that he knows give him the best practical results. He has learned to do these things because they are his tricks in the trade, which makes him a "skilled worker" rather than just a laborer. One of these "tricks" has been to discover the proper submersion time for each kind of article galvanized to produce the highest quality finish, at the lowest possible cost. A thought is expressed outwardly, and mechanically by an action; so in galvanizing, a scientific principle is expressed by a technique, or the manner in which the galvanizer manipulates his work to get the results he desires. The question, then, is—"How does the galvanizer know in practice that his article has been in the bath the right time to give the lightest zinc coating, the highest quality finish, and the lowest cost. He

would probably tell you, "That is my business; that is how I make a living."

But there are practical indications of everything if you understand how to read them. For example, the article goes through a flux, and then down into the zinc bath. The article is at room temperature when put in. That is the setup. Well, the first thing he knows is that for the zinc coating to be just right, and lightest, the article must be left in the bath just long enough for it to come to the exact temperature of the galvanizing bath. "How can he tell this?"

In going through the flux, some of it sticks to the work. Flux is like a cork; it has a very much less specific gravity than the metal, and therefore under the right conditions it will tend to slip off of the surface of the work and come to the top of the galvanizing bath. When it is "cooking" as the galvanizer calls it, gas bubbles and balls of flux rise to the surface of the bath all around where the article is below in the bath. As it "cooks" and "cooks," the flux balls get fewer and fewer, and finally the gas ceases, and no more flux balls rise to the surface of the bath. That means the article is done; it has come to exactly the same temperature as the galvanizing bath, and if taken out now, and handled right, and carefully, it will have the lightest zinc deposit, and will also have the highest quality coating finish. And that is the practical secret of hand-operated perfect hot-dip galvanizing. The time in the bath varies for the different kinds of articles, the different gages of base metal, the bath temperature, and many other factors and conditions, so his skill comes in being able to recognize and know what is the right time for all kinds of articles and all kinds of conditions.

### No Guess Work

It will be recognized that what has just been described **is no guess work.** It is the operator's skill in his trade, and it is these various "skills" of one kind or another that give a so-called uneducated man his tight hold on his job. Personally, the writer believes these men are educated; but their education is not balanced; it is very, very high education out in one direction, and the knowledge instead of being book knowledge obtained by sight and memory is feel or touch knowledge obtained by contact. In peace time, the first has its superiority; in war time, the second becomes the most important, since actual producing, or making of things is of vital importance.

**RESULTS OF TEST**
**Cans — Submersion Tests**

| **Lot Number** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Started | 3:50 | 3:06 | 2:00 | 12:35 | 10:25 |
| Stopped | 4:20 | 3:50 | 2:59 | 1:45 | 11:50 |
| Time | 30 | 44 | 59 | 70 | 85 |
| Quantity | 72 | 72 | 72 | 72 | 72 |
| To flux box | | Same time for all lots | | | |
| Through flux | | Same time for all lots | | | |
| SUBMERSION TIME | 0.20 | 0.40 | 0.60 | 0.80 | 1.00 minute |
| Withdrawal time | | Same time for all lots | | | |
| To Pile | | Same time for all lots | | | |
| Dry Pickled Wt. | 271 | 271 | 271 | 271 | 271 |
| Galvanized Wt. | 342 | 345.5 | 355 | 355.5 | 356 |
| Zinc Deposited | 71 lbs. | 74.5 lbs. | 84 lbs. | 84.5 lbs. | 85 lbs. |

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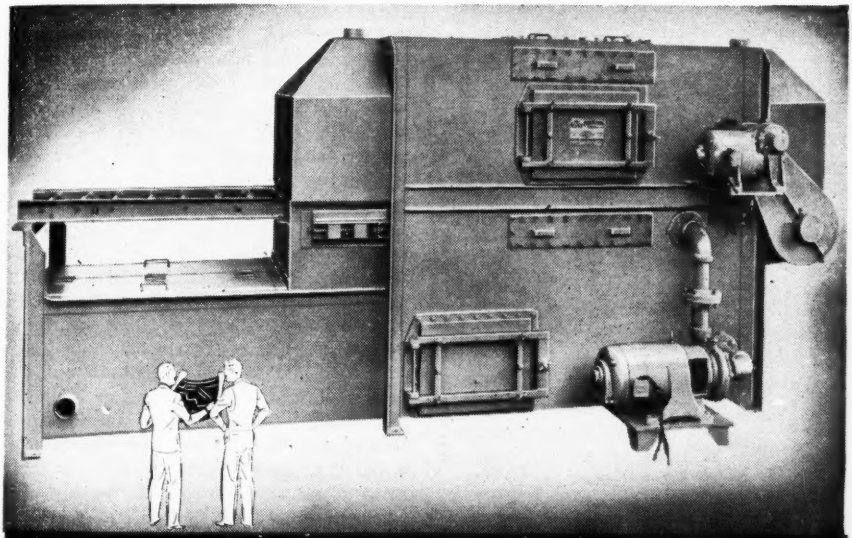

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### Tests Reveal What Happens in Practice

A careful description of the practical operation of galvanizing has just been given to show more clearly what is actually going on when the same operations are carefully studied and controlled. In a carefully planned test using five different lots of garbage cans of 72 in each lot, the submersion time in the galvanizing bath is controlled with a stop watch, and all other conditions and factors are held constant except the submersion time. This time in the bath is 0.20 - 0.40 - 0.60 - 0.80 - and 1.00 minute submersion. Since the test was made on a full-sized plant pot under normal operating conditions, there is a very slight variation in the submersion time because these practical conditions were selected for the test.

### Results on Graph

The results obtained from these tests were all placed on a graph as shown in Fig. 1 to see how the various times of submersion affected the weight of zinc deposited. It is interesting to note immediately that a general principle of galvanizing is here clearly demonstrated. This general principle is — "The longer the submersion time in the molten zinc, the heavier the zinc will be deposited as galvanized coating. This principle can be plainly seen by studying the graph in which the curve plotted shows the pounds of zinc deposited on each lot of 72 articles under identically the same operating conditions except the one thing, the variation in the submersion time in the bath.

### Coating Time

Now if we try to tie the results of these scientific tests in with the regular routine described as that taken by the practical operator of watching for his flux bubbles to stop coming to the surface, we find that, according to the curve, the proper submersion time for this particular kind of article and size, and so on, is at a submersion time of 0.60 minute. Since the articles are cold, or at room temperature when they go into the bath at first, the zinc would just cling to the surface. Finally, as the article gradually reached the same temperature as the bath, there would be a tendency to hold or desposit the correct amount of zinc. This is indicated at 0.60 minute submersion time in the bath.

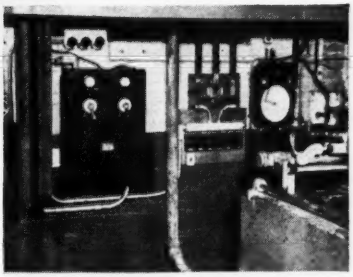
### Alloying Time

The practical galvanizer knows if he loses an article in the bath that if left there until the end of the day before fishing it out that it will have an extremely heavy metal coating on it, and from experience with such coatings when cold and hot, he knows that this submersion time which has been far too long has given him a zinc-iron alloy coating which is very brittle, cracks off easily, and makes the article worthless. He also knows from his own skill and practical experience that alloy starts to build up just as soon as the flux bubbles stop, because that indicates that the article is at the same temperature as the bath, and since no more flux balls come to the surface, the article is clean, and the finish will be perfect. Longer submersion time in the bath, or too long submersion time, is indicated by the sharp upward turn in the graph curve at 0.60 minute submersion and at the "pounds of zinc deposited" 84 - 85.

### Galvanizing Principles Definite, But Difficult to Discover Under Practical Operating Conditions

It is extremely difficult to discover definite galvanizing principles under normal practical operating conditions. This is due to the fact that they act

Seven G-E "500's" connected in series to supply 500 amperes at 40 volts for anodizing. Cubicles are located out-of-the-way under a staircase on the opposite side of the plating room wall. The space occupied by the rectifiers formerly was waste space. The G-E Regulator and push-button controls (for stepping up the voltage to the maximum required) are located on the wall adjacent to the anodizing tanks.



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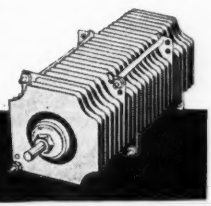
G-E Copper-Oxide Rectifiers provide maximum flexibility in supplying your d-c power needs for electroplating and anodizing. They may be grouped in parallel to handle heavy current loads or in series to obtain higher voltage for special processes. They provide decentralized power sources for economy . . . may be switched easily to new jobs . . . additional cubicles may be added easily as demands increase . . . they may be located in convenient locations . . . require practically no maintenance . . . have practically unlimited life.



GENERAL ELECTRIC

like a football team, some on one side and some on the opposite side. For many years, in fact, right up to the time of these research investigations, the entire galvanizing industry was absolutely positive "that the higher the bath temperature was held, the lighter the zinc would be deposited as galvanized coating." As a matter of fact, the truth is that the scientific principle was found to be exactly the opposite, namely, "the lower the bath temperature, the lighter the zinc will be deposited as galvanized coating." Other factors which increased the weight of coating acting along with the increase in bath temperature, under practical conditions covered up, or concealed the basic principle and relation of the temperature of the bath, to the amount of zinc deposited. By standardizing all conditions except one, and then varying that one component, each principle when used alone, stands out very clearly. In this test we have three things revealed which are as follows: 1. The longer the submersion time, the heavier the zinc will be deposited is a definite galvanizing principle; 2. Submersion time, for this article up to 0.60 minute is coating time; 3. Submersion time beyond 0.60 minute in the zinc is alloying time, and builds up excessive zinc and alloy deposit and ruins the product.

---

**"Metal Cleaning in War Time."** The Magnus Chemical Company, Inc., 208 South Ave., Garwood, N. J., manufacturer of industrial cleaning materials, emulsifying agents and metal working lubricants, is now issuing this new 50-page, illustrated handbook. The handbook discusses in detail the metal cleaning problems in the production of shells, shell cases, fuses, other munitions and other parts and objects involved in the production of material and equipment vitally important to the War Program.

In addition to the specific cleaning problems of munitions, this handbook also covers the outstanding cleaning operations required in the production of ordnance, small arms, material, transport equipment and other metal items which must be built to meet the complex and extensive demands of the war. Special emphasis is placed on the new Magnus Emulso-Dip and Emulso-Spray methods of removing oily dirt, drawing compounds and metal particles from metal objects to leave a physically clean surface.

The handbook is complete with many flow charts, illustrations and diagrams of washing machines used in the manufacture of munitions and other vital metal objects. Several pages are devoted to cleaning in maintenance and repair shops and the important subject of the cleaning and protection of employees' hands and skin. Copy free upon request.

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**Thor Portable Electric Tool Catalog No. 37.** The complete 1942 line of Thor Portable Electric Tools is described in an attractive 64-page catalog now being issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. Containing four major sections, the catalog, which is designated as the No. 37, gives complete descriptions, specifications, and prices on the entire Thor line of universal type electric drills, drill stands, screw drivers, nut setters, tappers, saws, hammers, nibblers, grinders, sanders, polishers, and electric tool accessories.

Printed in two colors and profusely illustrated with photographs of tools in operation on various types of work, the catalog is a helpful guide to the selection of proper equipment for different applications. It contains much pertinent information regarding the uses and construction of Thor tools.

Copy of Thor Catalog No. 37 free to industrial executives, production men, and engineers upon request.

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**For a Chemically Clean Surface Prior to Plating.** The DuBois Company, 1120 W. Front St., Cincinnati, Ohio, is now issuing a bulletin describing methods for obtaining a chemically clean metal surface prior to plating. The information contained in this bulletin is concisely written and should be of particular value to all those engaged in the finishing of metal products.

Copy free upon request.

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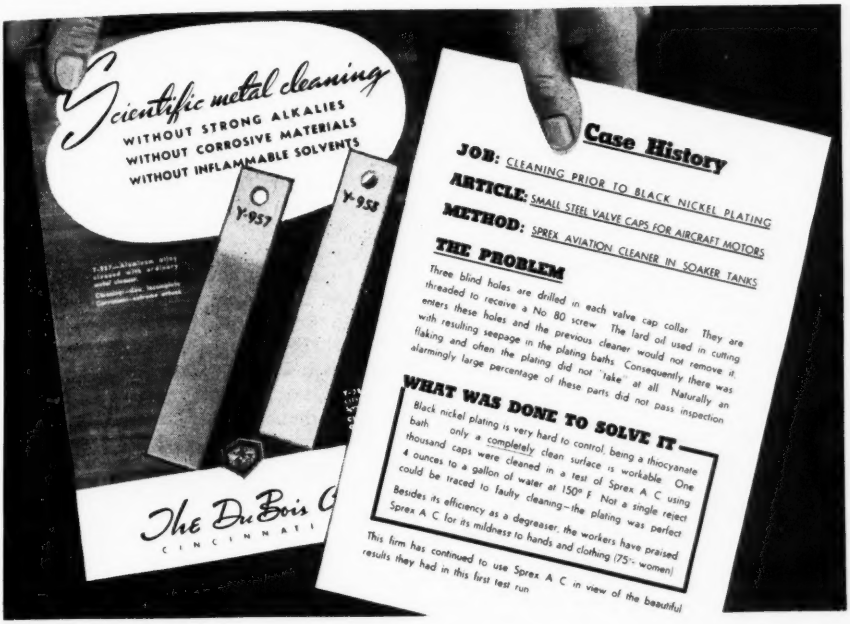
# HELP for the man in charge of METAL CLEANING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The "Case History" shown above is one of a series illustrating how Du Bois Products eliminate metal cleaning problems. Describe your metal cleaning procedure and we will send you a select group of "Case Histories" that show how we have helped improve operations *similar to yours.* Send your request for this helpful free literature today.

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# *Finish Drying by Infra-Red Method*

By PAUL H. GALLAGHER
Engineer, Infra-Red Equipment Corporation, Chicago, Illinois

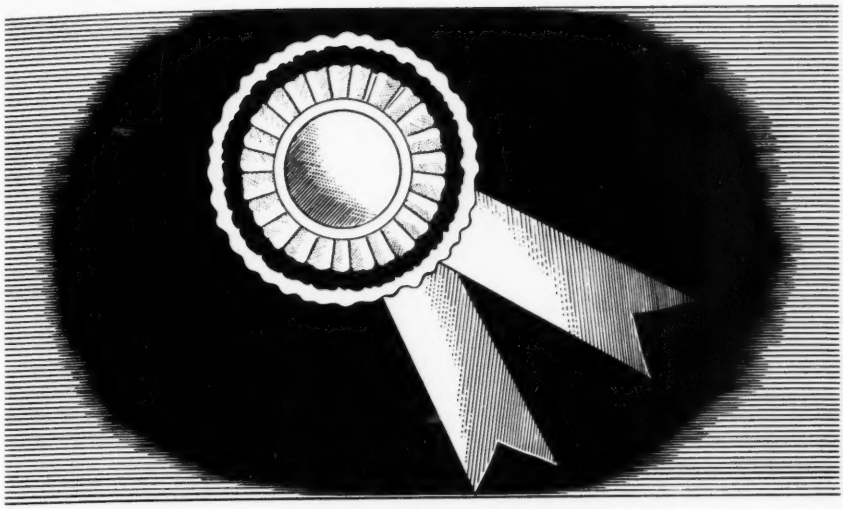
RECENTLY, the Infra-Red Equipment Corp., 1217 W. Washington Blvd., Chicago, Ill., developed a new type of gas-heated oven employing radiant type gas burners which utilize the advantages of both Infra-Red ray and convection heat baking methods. The equipment has been adapted to converting old ovens. Many old ovens thus equipped provide maximum efficiency in minimum baking time. Infra-Red burners have proved very efficient and economical in operation and reduce the cost of baking considerably.

Let us examine the features of this newly developed equipment to see how the cost of operation, for example, has been reduced. First, the gas and air are premixed in the proper proportions for perfect combustion before delivery to the burner and this mixture is then forced directly onto the refractory surfaces which are brought up to incandescent temperature and emit Infra-Red rays. The premixing of the gas and air before entering the burner eliminates the necessity of entraining secondary air and thus the gas is completely burned leaving no obnoxious fumes in the products of combustion.

The second item to consider is the effect of the Infra-Red rays on the articles being baked. These rays form a considerable part of the total heat and there is actually no loss in transmission of them. Infra-Red rays can be transmitted from the source to the article to be dried with perfect efficiency, there being no effect of intervening temperature conditions on them. The full force of the Infra-Red rays is effective for heating the articles and there is no loss through the stack.

With speed in production now being demanded in all lines, the reduction in time required for baking with this modern method aids in increasing the flow of goods along the production lines. The Infra-Red generators have a wide range of turn-down, permitting a great amount of heat at the start for bringing the oven up to the required temperature in the shortest possible time. After the baking temperature is attained, the generators can be turned down for holding the temperature at that point and this can be done automatically. As an example of this, an oven can be heated to 300 deg. F. in about seven minutes, and to 400 deg. F. in about 11 minutes, from a cold start. The advantage of this is obvious in batch type ovens where the recovery time between batches is a considerable portion of the baking cycle.

Urea formaldehyde enamels can be baked with the Infra-Red method in 4 to 9 minutes. Oil base paints which formerly required an hour to bake can be done in 16 minutes; and japan,



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But remember that distinction is based on TIME. First products must be "first."

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one of the slowest baking finishes which in innumerable cases formerly required one and one-half hours and longer to bake, can now be baked in 20 to 25 minutes.

The Infra-Red method can be used with any kind of finish and it need not be limited to special fast baking finishes. This is particularly essential in recent days, since fast baking finishes are not always obtainable and former oil base, slow baking types must be substituted.

The following data on various gauges of metal were compiled after tests run with the Infra-Red method of heating: No. 20 and 16 gauge metals were placed in an oven with the air temperature at 250 deg. F. The 20 gauge metal rose to 250 deg. F. in three minutes and then leveled off at a temperature of 270 deg. F. in four minutes. The 16 gauge metal reached 250 deg. F. in three and one-half minutes and 270 deg. F. in five minutes.

Other thicknesses of metal showed a correspondingly similar heat-up time. It is very significant that the metal temperature reached a higher point than the air temperature of the oven. This shows directly the effect of the Infra-Red rays.

These two gauges of metal were then placed in the oven with an air temperature of 350 deg. F. The 20 gauge metal reached 350 deg. F. in five minutes and the 16 gauge metal reached this temperature in six minutes, or about a minute longer than required in a 250 deg. F. oven.

This type of oven heating is readily adapted to baking all kinds of work regardless of size, shape, or thickness of the metal and its effectiveness is therefore not limited to uniform articles. Included in this Infra-Red method is a complete recirculation system which draws the air from the top of the oven and delivers it to the bottom where it flows over the generators and being again heated maintains an even heat in all parts to within plus or minus five deg. F. This even temperature permits utilizing the greatest capacity of the oven, since the articles can be placed throughout the height of the oven and this evenness also assures uniformity of finish on all parts of the articles. A sufficient amount of the recirculated air is exhausted, thus maintaining clear atmosphere which results in paint of higher luster.

Figure 1 shows a batch type oven

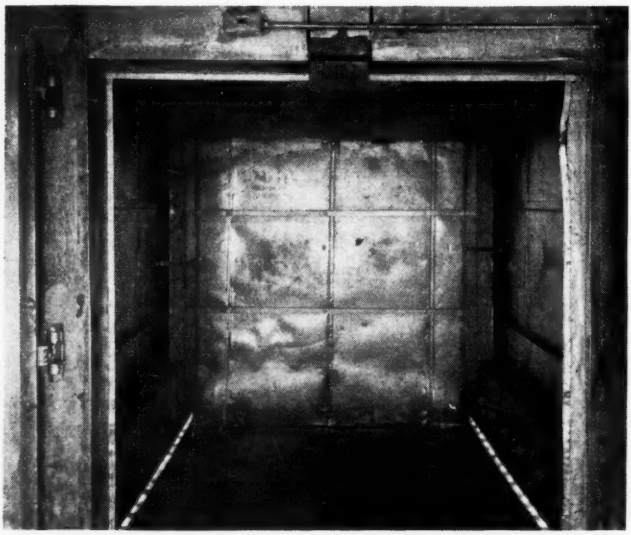
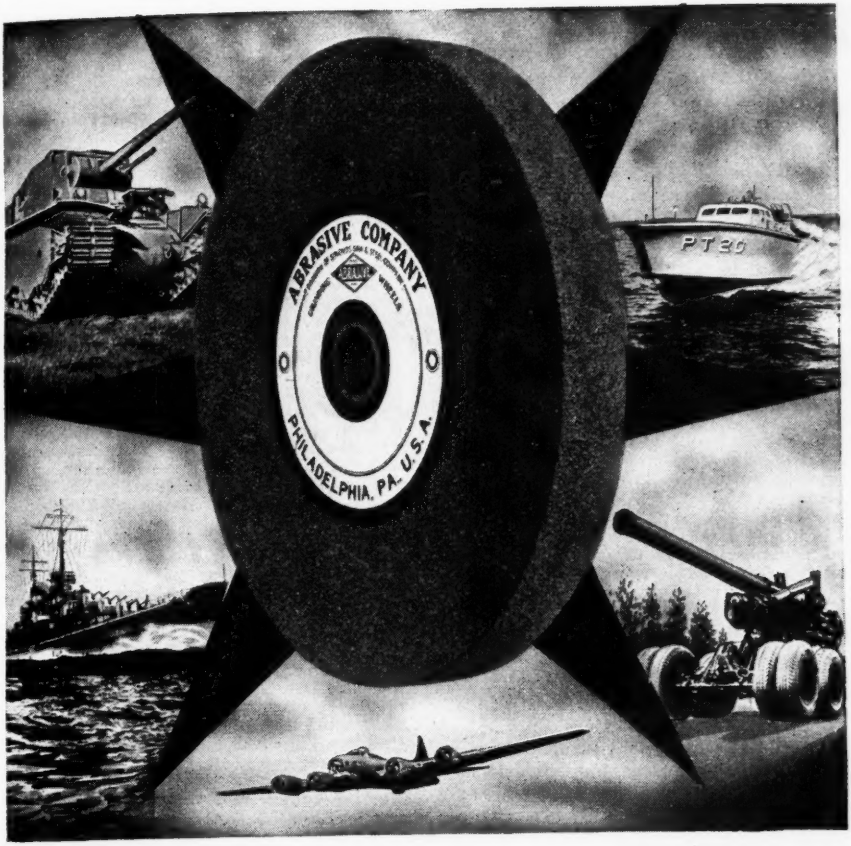


Fig. 1 — Illustration showing a batch type oven which was converted to the Infra-Red method of baking.

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which was converted to the Infra-Red method of baking. The radiant burners are positioned in the lower corners and arranged so the radiant heat is directed onto the painted articles. Recirculated air from the ducts flows over the burners, is heated, and flows around each piece of work being dried. This particular oven is an old one that has been converted to the modern Infra-Red method of baking and now has the same high efficiency as a new oven.

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**Plating Conveyor Bulletin.** Bulletin SA-101 of the Hanson-Van Winkle-Munning Company, Matawan, N. J., gives illustrations and detailed descriptions of the construction and the improved features of Semi-Automatic Heavy Duty Plating Conveyors. The bulletin describes the various types of drives, a wide range of heavy duty carriers, methods of agitation or "motion plating" and ventilation; also the operation of these machines in combination with full automatics. The bulletin is profusely illustrated throughout.

Copy free upon request.

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**"Modern Pickling of Iron and Steel"** is the title of a 12-page booklet now being issued by The Enthone Co., 442 Elm St., New Haven, Connecticut.

This booklet describes the company's acid addition agent, to be used in both cold hydrochloric and hot sulfuric acid pickles. The use of this addition agent is stated to result in faster pickling, reduce attack upon the steel, saving of acid and reduction of fumes. The use of the material for pickling of springs to prevent embrittlement and in electrolytic pickling is described. A special use in hydrochloric acid, for stripping heavy chromium coatings, is also explained.

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**Northern Crane and Hoist Catalog.** Northern Engineering Works, 2607 Atwater St., Detroit, Mich., is now distributing a catalog containing a series of bulletins having illustrated, descriptive, and tabular information on Northern Overhead Traveling Cranes and Electric Hoists, Super-Cranes for heavy duty service, Type "SA" and "LSA" Beam Girder Cranes, Type NE Electric Cranes, Electric Hoist Cranes, Hi-Lift Hoists, and so on. Copy free upon request.

**Oakite News Service.** While the urgent demand for great quantities of ammunition has made mass production techniques essential in the manufacture of small arms ammunition of the .30 and .50 calibre as well as 20 mm. and 37 mm. sizes, precision requirements of the highest order are nevertheless rigidly adhered to. The considerable number of cleaning operations required in small arms ammunition production, therefore, must be completely dependable and definitely standardized, it is pointed out in a four-page article appearing in the March-April issue of "Oakite News Service," industrial cleaning magazine published by Oakite Products, Inc., 20 Thames St., New York City.

Complete with flow sheets and diagrams, the article states that the large number of relatively small parts which must be handled make it important that the cleaning equipment used assure a smooth flow of work with minimum handling. A drum-type washer, providing a tumble-wash followed by a spray-wash and using an alkaline material is described in detail. Requirements which must be met by the cleaning material selected are given. Additional factors such as correct timing during washing operations and the choice of an easy-to-remove, uniformly mixed compound in previous drawing operations are also given consideration.

Also of interest is an article describing the Bullard-Dunn Process as applied to wartime production. After a discussion of the nature of the operation, certain facts concerning alkaline pre-cleaning and its importance in securing maximum efficiency are given. Also included is a listing of the many applications of the process.

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**Despatch Chemical Laboratory Forced Draft Oven Bulletin.** A four-page folder describing Despatch Laboratory Ovens is now being issued by Despatch Oven Company, 722 Central Ave., Minneapolis, Minn. This series of ovens is available in 48 standard models, having a temperature ranging up to 1250 deg. F.

The ovens are primarily designed for analytical laboratory work. They are also said to be ideal for test baking and drying of paints and lacquers, varnishes, the drying of various solvents from compounds for aging, curing, for sterilizing instruments and glassware and a multiplicity of other uses involving even small production heating and drying and baking work.

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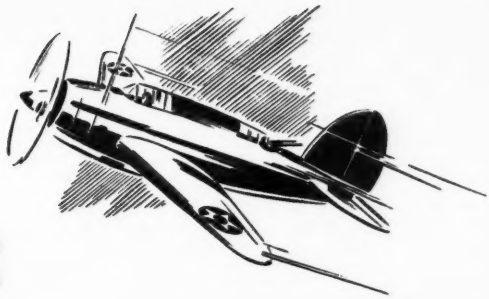

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# *Cyanide Zinc Plating*

By EDWARD FINNIE

Plating Chemist, Chrysler Corporation

THE use of zinc in the rustproofing field has become more common because, primarily, of the high cost of cadmium metal. Cadmium costs from eight to ten times more than zinc. This cost has influenced platers to coat a part of their work with zinc rather than cadmium and with no ill effects, for zinc coatings, at the present time, are very nearly as effective as cadmium coatings. It is claimed that cadmium plate will not corrode as quickly as will zinc plate, but this objection is offset by the use of a dichromate dip after plating.

Another objection to zinc plating is that it discolors too easily. But if the drying is very thorough and if mercury is used in the plating bath and if the dichromate dip is used, then the coating will not tarnish any sooner than cadmium plating. So, taking cost and appearance into consideration, zinc plating is the process suited to the purse of the plater.

Of the zinc plating processes, the cyanide bath is the better, for it has a better throwing power than the acid zinc bath and it is cheaper to operate. This paper will deal with the cyanide zinc plating cycle and its various phases. The plating cycle is as follows:

Cleaner
Hot Water Rinse
Acid
Cold Water Rinse
Cyanide Dip

Load in plating barrels

Zinc Plate

Cold Water Rinse
Cold Water Rinse
Dichromate Dip
Cold Water Rinse
Hot Water Rinse
Dryer

### Cleaning and Pickling

Work to be plated may be cleaned of grease and oil by either soaking or tumbling in a hot solution of any good commercial cleaner of about 8 oz./gallon concentration or in a solution of 22 oz./gallon sodium carbonate and 2 oz./gallon caustic soda.

Of the two methods of cleaning, the tumbling is the most effective, as it assures the plater of a clean job on all of his work because the work burnishes itself while tumbling and all of the work is subjected equally to the action of the cleaner. The soak method, in which the work is placed in a basket and then placed in the cleaner, usually does not result in a perfect job of cleaning because the work massed in the center of the basket receives very little cleaner action. However, the soak method is cheaper because the equipment needed is merely a steel tank and monel baskets and heating element, whereas the tumbling method requires monel metal cylinders and a tank set up with saddles and gears and motors for the turning of the cylinders.

After cleaning, the work is given

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a rinse in hot or warm water and then a dip or tumble in the acid bath. The warm or hot water will help to keep the acid warm. The acid in either the dip or tumble method should be kept at approximately 100 degrees F. A tumble of two or three minutes will suffice for most work; the time, of course, depends on the work to be cleaned. The acid dip used in the soak method will be about 20 or 30 per cent whereas a concentration of 10 or 15 per cent is ample in the tumbling method. In the soak method the time required for an acid dip will depend on the work to be cleaned. The acid used in either case will be muriatic or sulfuric.

As in the cleaning process, the work pickled in the basket will not be as clean as the work in the barrels for the same reasons. And the concentration of the acid used is greater and must be changed oftener; hence, a greater cost in maintenance. While the initial cost in installing a tumbling system is greater, the maintenance is less.

After the acid dip a cold water rinse is used and then another cold water rinse with some sodium cyanide dissolved in it. This dip will neutralize any acid remaining on the work.

**Plating**

Following are a few good zinc plating solutions:

Zinc Cyanide ..... 8.0 oz./gallon
Sodium Cyanide ..... 3.0 oz./gallon
Sodium Hydroxide ... 7.0 oz./gallon

Zinc Oxide ..... 6.0 oz./gallon
Sodium Cyanide .....10.0 oz./gallon
Sodium Hydroxide ... 2.0 oz./gallon

The temperature of a zinc solution is best kept at between 40 and 50 degrees Centigrade. The current density necessary is 10 to 20 amperes/sq. ft. The anodes used may be pure zinc or mercury-zinc or aluminum-mercury-zinc. The anodes containing other metals than zinc are far more expensive than the pure zinc. Although they give a better looking deposit than the pure zinc, the pure zinc anodes used with the addition of mercuric oxide in the plating bath will give as good a result and this is probably cheaper.

The addition of mercuric oxide to the bath up to 2 per cent of the zinc content increases the cathode efficiency and gives a whiter deposit. While the ordinary zinc solution will not plate cast or malleable iron, the addition of mercury will make possible the plating of these metals. With the addition of mercuric oxide the current density may be raised to 30 or 40 amps./sq. ft.

Incidentally, about zinc anodes. The aluminum-mercury-zinc anodes are sludge-free while the mercury-zinc and the pure zinc anodes produce sludge. The polarization of the aluminum-mercury-zinc anodes is practically constant at 2.9 volts while polarization of the mercury-zinc anodes and the pure zinc anodes at continuous plating will be 3.0 to 3.1 volts.

Another zinc solution that the writer has used successfully is made up as follows:

Zinc Cyanide .....10.0 oz./gallon
Sodium Cyanide ..... 4.0 oz./gallon
Sodium Hydroxide ...10.0 oz./gallon

This solution is analyzed and kept at these concentrations:

4- 6 oz./gallon...Zinc
10-12 oz./gallon...Total Cyanide
10-12 oz./gallon...Sodium Hydroxide

The addition of mercuric oxide is used for a whiter deposit.

Regarding plating barrels. The writer has had experience only with those made of micarta, bakelite and mercilite. Of these materials, the

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mercilite has withstood the action of the solution the best. Using these barrels under exceptionally heavy production plating, approximately a ton of work is plated every hour, these barrels stood up very well.

### Rinsing and Drying

After plating, the work is immersed in a running cold water rinse, then in another cold rinse, then in a dichromate dip, then into a warm water, then into hot water and then into a dryer.

Two cold water rinses may be necessary to remove all of the zinc solution from the work. This added rinse tank will be a precaution against neutralizing the acid dichromate dip.

The dichromate dip is recommended for the prevention of corrosion products resulting from damp or wet zinc. This dip gives the zinc coating an increased resistance to the action of water. A suitable dip may be made up of 3.5 oz./gallon of sodium bichromate or sodium dichromate and 1.8 cc/gallon of sulfuric acid. The dip is used at room temperature and the immersion time is 5 to 20 seconds with 10 seconds usually sufficient.

Following the dichromate dip, use a warm water rinse and then a hot water rinse. Then put work in a dryer. The dryer may be of a centrifugal design of a horizontal revolving cylinder which carries the work through the cylinder surrounded by steam coils. Other dryers on the market probably would be as suitable as these mentioned.

Remember this—that the resistance to corrosion on zinc coatings depends largely on the perfect drying of the plated work.

---

**Paints for Black-Out Purposes.** During this war emergency, complete understanding of the latest techniques developed for the proper use of black-out paints is absolutely essential—faulty applications may result in future loss of life; and at present, in penalties for violations.

In the light of the above, and in the true spirit of patriotism and co-operation, the chemical laboratories of The Wilbur & Williams Company, 755 Boylston St., Boston, Mass., recently released a brief but concise bulletin on the proper use of emergency paints for black-out purposes.

Window glass black-out exterior paint—a heavy-duty, opaque, flat black to be applied on any clean window glass with brush or spray gun. The government requests that all glass be painted on the outside to eliminate sheen. This paint is made for this purpose. According to the manufacturer, it may be easily removed by washing with mineral spirits or kerosene.

Window glass inside white paint—where black paint is applied on the outside of the window, it will probably be essential to apply a white window glass paint on the inside to produce maximum light-reflection for the electric illumination. Window glass inside white paint is recommended for this purpose.

Window glass blue translucent paint—for glass areas that should not be completely blacked, but where a minimum of light is required, such as electric directional signs, automotive headlights, and certain industrial windows—No. 3 window glass blue translucent paint is recommended.

White traffic guide paint—this product is based on formulas found effective in London. This is a white paint which dries in 15 minutes, does not yellow even over a bitumastic paving, and will stand considerable pedestrian traffic. It is used for marking subway entrances, sidewalk curbs, obstructions, arrows, air-raid shelter entrances, rear end of automotive equipment, pedestrian traffic lines, and so on.

Copies of the bulletin will be sent free upon request.

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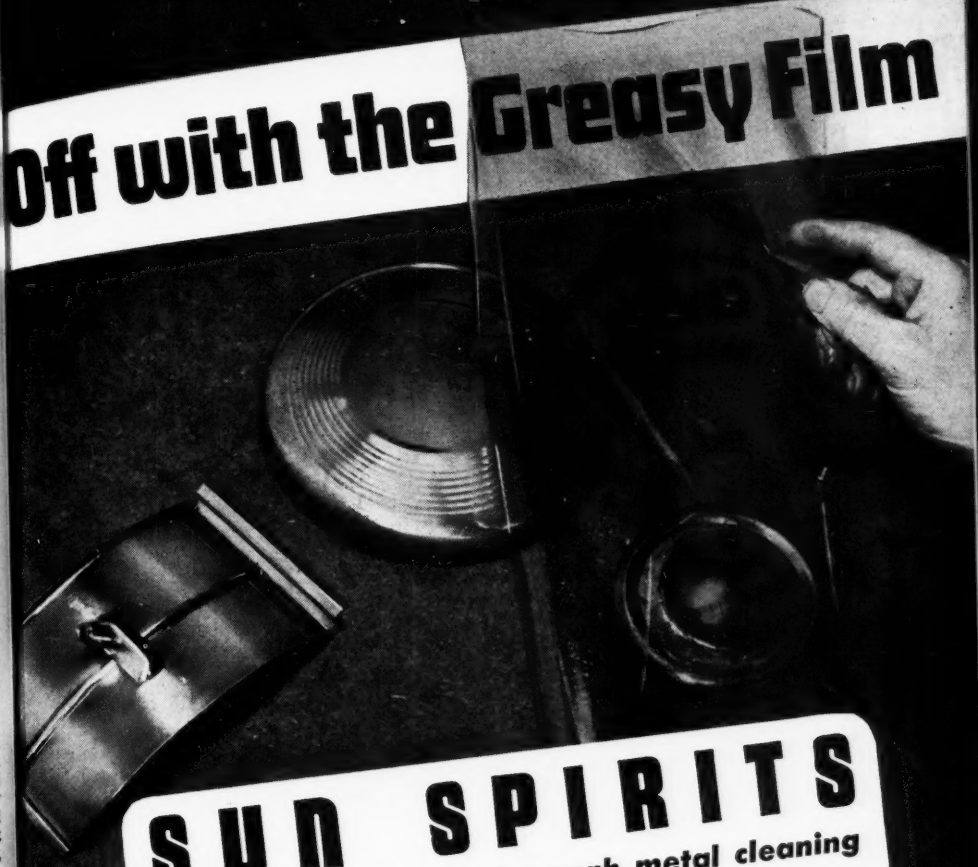
**Chemical Dictionary.** A Chemical Dictionary consisting of 85 pages of chemical terms has been compiled by F. H. Campbell, and is now being issued by Chemical Publishing Co., Inc., 234 King St., Brooklyn, New York.

This compact dictionary meets the insistant demand for a low priced reference work giving in condensed form essential information. This dictionary is indispensable to chemists, chemical engineers, technicians, students, and all others who wish to be kept up to date on the new chemical terms and expressions. The price per copy is $2.50.

# Off with the Greasy Film



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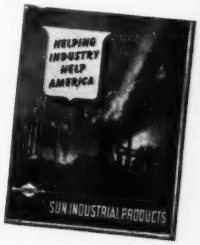
Call in a Sun Oil Engineer — a Doctor of Industry — for advice on using Sun Spirits in your plant. For helpful examples of Sun service, get your free copy of "Helping Industry Help America." Write SUN OIL COMPANY, Philadelphia.

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# Modern Gold Plating—Part 24

By JOSEPH B. KUSHNER, CH. E.
Metal Finishing Consultant
New York City

IN making an analysis of drag-in contamination, several assumptions have to be made. These assumptions are:

1. The operation of dipping a rack or piece of work into a rinse tank, then into a plating tank and out, can be treated as a continuous process as far as the liquid carried into and out of the plating tank by drag-in and drag-out is concerned, where many pieces or racks are plated daily[1]. In other words, we can treat this small flow of liquid into and out of the plating tank as the flow of liquid in a pipe and tank system.

2. The volume of liquid carried into the tank, drag-in, is equal to the volume carried out, drag-out, for any given number of pieces.

3. An average value can be struck for the drag-in per piece or rack plated.

4. The daily evaporation from the given plating bath under consideration varies only with the time where the temperature of the bath is held constant.

### Nomenclature

$V_0$ is the volume of the plating solution in the bath at proper operating level.

V is the volume of the plating solution in the bath at any time during the day after n racks have passed through it.

$V_1$ is the volume of the plating solution at the end of the working day after $n_1$ racks have passed through it.

a is the average volume of drag-in or drag-out per rack plated.

b is average amount of liquid evaporated from the plating bath per rack plated. It can be defined mathematically as:

$$b = \frac{V_0 - V_1}{n_1}$$

$C_0$ is the concentration of the harmful or contaminating ion in the rinse water.

$C_i$ is the concentration of this ion in the plating bath at the start of operations.

C is the concentration of the ion in the plating bath at any time during the day after n racks have gone through the bath.

$C_x$ is the concentration of the ion in the bath after x days of operation.

### Case 1: No Losses by Evaporation

Consider the plating tank shown in Figure 1 as Case No. 1. If there was

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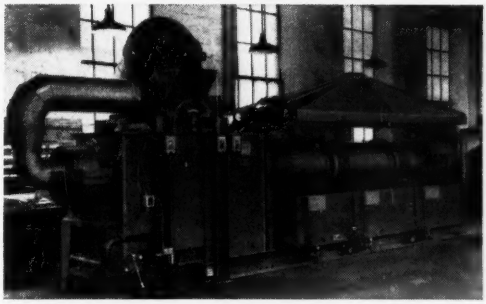

**Model 283**—one of 4 Revolving Drum-type Autosan Metal Parts Cleaning Machines – washes, rinses, dries, and has additional section for another desired operation.

**MR-2**—one of 5 compact Conveyor-type Autosan Cleaning Units – designed for the washing of small parts in plants where space is limited.

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absolutely no loss of water by evaporation (a purely hypothetical case inasmuch as all plating baths lose water by evaporation, particularly the warm baths), a very simple condition would result: The dangerous ion would never get more concentrated in the plating tank than it is in the rinse water, for even though we carry in a given amount of the ion each time we put a rack in, after a while we carry out the same amount, that is, the concentration of the ion can build up or down only to the limiting value $C_o$. This can be shown at once by setting up the differential equation for the process.

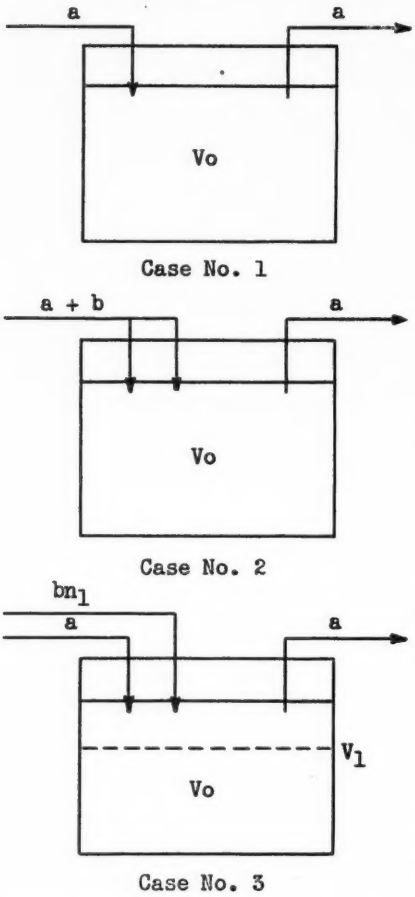


Fig. 1—Diagrammatic views of various average plating tank setups.

$$(1E)\quad \frac{V_o dc}{dn} = aC_o - aC$$

This differential equation states mathematically that the increase in the given ion in the plating tank as a rack is being plated is equal to the amount of ion we carry in minus the amount we drag-out. Solving directly by standard methods given in any text we get:

$$(2E)\quad C = C_o\ (1 - e^{-an/V_o}) + C_i e^{-an/V_o}$$

where e is 2.718, the base of natural logarithms.

As can be seen at once, as n gets large (if many pieces are plated daily) the e terms tend to vanish and we get as a limiting result $C = C_o$, which bears out our previous remark that ultimately the concentration of the ion in the tank will become equal to the concentration of the ion in the rinse water.

### Case 2: Evaporation Losses Continually Replenished

In all actual cases, evaporation does occur and in heated tanks this evaporation is considerable. In some automatic plating installations water losses by evaporation are continuously replenished by automatic feed pipes; thus the volume of the plating bath is kept constant. In the great majority of cases, however, water is replenished intermittently, the usual practice being to add water at the start of the plating day, or perhaps twice or more daily, as the occasion demands. We will deal with automatic replenishment first.

Pennsalt Cleaner is helping speed the production of Machine Gun barrels in this plant, with fast, efficient stripping and cleaning.

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The illustration above shows machine gun barrels being cleaned. Pennsalt Cleaner is used to clean new barrels before chrome plating and, in reconditioning barrels, to strip chrome from the steel before replating.

In all their exacting duties Pennsalt Cleaners have an outstanding record. Here it is:—*Increased production because of fewer rejects* . . . a reduction in cleaning costs . . . smoother plating surfaces and more efficient stripping, through better conductivity.

A test in your plant under your own conditions will show you why Pennsalt Cleaners have won the confidence and endorsement of so many manufacturers in a wide range of metal cleaning operations. An experienced technical staff is at your service for information or advice, without obligation. Or write fully to our Pennsalt Cleaner Division, Dept. P.

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Consider the automatic plating tank shown in Figure 1 as Case No. 2. Water is continuously evaporating from it but this water is being continuously replenished so the volume of the plating bath does not change during operations. The dangerous ion enters the plating bath as water replenishment and by drag-in. The differential equation for this set up is:

$$(3E) \quad V_o \frac{dC}{dn} = (a + b)\, C_o - aC$$

This is an equation very similar to (1) except that it makes allowance for the increase in the ion due to evaporation. Solving it by standard methods gives as the answer:

$$(4E) \quad C = C_o\left(\frac{a+b}{a}\right)\left[1 - e^{\frac{-an_1}{V_o}}\right] + C_i e^{\frac{-an_1}{V_o}}$$

Where e has the same meaning as before.

This equation gives the concentration of the ion in the plating bath at any time during the particular day. After x days of operation the concentration of the ion in the bath will be equal to:

$$(5E) \quad C_x = C_o\left(\frac{(a+b)}{a}\right)\left[1 - e^{\frac{-an_1 x}{V_o}}\right] + C_i e^{\frac{-an_1 x}{V_o}}$$

What is the limiting value of this equation? As before, we note that the e terms will vanish as $xn_1$ increases and ultimately we get as a limiting value:

$$(6E) \quad C = \frac{(a+b)}{a} C_o$$

This means that if the evaporation rate is high and the drag-in is low, the concentration of the harmful ion can build up to many times its original concentration in the rinse water. A practical example will illustrate this. In a gold plating operation, the plating tank runs at 180 deg. F. and the evaporation rate is .5 fluid oz. per rack plated. The drag-out is .005 fluid oz. per rack plated. To what value can calcium carbonate, present initially in the rinse water in a concentration of 10 grains per gallon, build up? Using the above equation we get:

$$C = \frac{(.005 + .5)}{.005}\, 10 = 1010 \text{ grains}$$

per gallon. In ounces per gallon the increase is from .023 oz. calcium carbonate per gallon to 2.3 oz. per gallon, a hundred fold increase.

This, of course, is based on the assumption of continuous water replenishment. Let us see what happens if we replenish the evaporated water intermittently.

### Case 3: Evaporated Water Replenished Intermittently

Consider the plating tank shown in Figure 1 as Case No. 3. For the sake of simplicity, let us assume we replenish the evaporated water in the bath once a day at the start of operations. We start with a full tank of solution of volume $V_o$. As the day progresses, the volume diminishes due to evaporation of water. This brings into play a new differential equation which makes allowances for the change in volume of the plating bath. Since the amount of water evaporated per piece plated is b, we can say that at any given time during the day after n pieces have been plated, the volume of the plating bath is $V = V_o - bn$. Making use of this fact, we set up our new differential equation.

$$(7E) \quad \frac{d\,(V_o - bn)\,C}{dn} = aC_o - aC$$

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100 Central Ave., Louisville, Ky. In Canada: Darling Bros., Ltd., Montreal, P. Q.

Upon carrying out the appropriate differentiation this simplifies to

$$(8E)\quad \frac{dC\,(V_o - bn)}{dn} = aC_o + (b-a)\,C$$

This equation is easily solved by standard methods to give the result:

$$(9E)\quad C = \left(\frac{a}{a-b}\right) C_o \left[1 - K^{a/b-1}\right] + C_1 K^{a/b-1}$$

$$\text{Where } K = 1 - \frac{bn_1}{V_o}$$

This will give any value of C for a given day because we have set up our differential equation that way, but at the start of the next day, water is poured back into the tank to bring the volume back to its original value $V_o$, which adds to the bath an additional amount of the harmful ion, equal to $bn_1C_o$. Because of this fact we have to set up a new differential equation for the second day of operation using as a new initial concentration of ion in the bath the value obtained by taking C at the end of the first day plus the increase in concentration $bn_1C_o/V_o$ due to adding water to replenish for water lost in evaporation. If this is done progressively from day to day we get what is known as a recursive series. By means of extremely tedious algebra this series can be summed and rearranged to give as a final result:

$$(10E)\quad C_x = C_1 K^{\frac{xa}{b}} + \left[\frac{bn_1C_o}{V_o} + \left(\frac{a}{a-b}\right) C_o\,[K - K^{a/b}]\right] \frac{(1 - K^{\frac{xa}{b}})}{1 - K^{a/b}}$$

where K is as before equal to

$$\frac{V_o - bn_1}{V_o} \text{ or } 1 - \frac{bn_1}{V_o}$$

The final result as it stands appears quite complicated. Let us see what will happen as the number of racks plated gets very large, as we did in the previous examples.

In the first place the terms containing $K^{xa/b}$ will vanish inasmuch as K is less than unity. This leaves us with the expression

$$\underset{x \to \text{infinity}}{C_x} = \left[\frac{bn_1C_o}{V_o} + \left(\frac{a}{a-b}\right) C_o\,[K - K^{a/b}]\right] \frac{1}{1 - K^{a/b}}$$

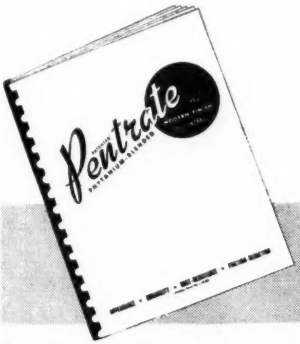
Since $K = 1 - \frac{bn_1}{V_o}$, we can simplify $K^{a/b}$ to $1 - \frac{an_1}{V_o}$, by the binomial since $\frac{bn_1}{V_o}$ will in general be a small quantity. If this is done wherever $K^{a/b}$ appears and the terms are rearranged we get as the final result, the limiting quantity:

$$C_x = \frac{(a+b)\,C_o}{a}$$

This is a surprising and interesting result. It proves that no matter whether we replenish the plating bath continuously, as may be done in automatic plating or whether we replenish the plating both intermittently, as is the usual case, after many racks have been plated we will always approach the same limiting result.

Because of the fact that the limiting values of equations 5E and 10E are the same and because they tend to approach that limit at the same rate[2], we can use either one interchangeably and we can safely take as the general equation of drag-in build-up:

*This space was reserved to tell some of the most sensational stories of the prominent place held by our* Phytanium-Blended **PENTRATE**, *the patented black finish for steel, on defense contracts throughout the country. These stories might have revealed names, places, or items—all of which are military secrets. So we censored this ad of our own free will in the interest of national defense.*

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**HEATBATH CORPORATION**

**SPRINGFIELD, MASSACHUSETTS**

$$(5E)\quad C_x = \left(\frac{a+b}{a}\right) C_0 \left[1 - e^{\frac{-an_1x}{V_0}}\right] + C_i e^{\frac{-an_1x}{V_0}}$$

The equation as it stands can be used directly in computing the increase in a given contaminating ion in the plating bath. However, if we determine $C_x$ after a few days operation only, we can make a simplification because $e^{-anx}/V_0$ is equal to $1 - \frac{an_1x}{V_0}$ when the exponential is small. This being the case equation 5E simplifies to

$$(11E)\quad C_x = \left(\frac{a+b}{a}\right) C_0 \frac{[an_1x]}{V_0} + C_i \left[1 - \frac{an_1x}{V_0}\right]$$

This equation has two special cases. If the initial concentration of the harmful ion is zero, that is, the plating bath is made up with distilled water and C.P. chemicals, as is often found in gold plating, equation 11E reduces to

$$(12E)\quad C_x = \frac{(a+b)\, n_1 C_0\, x}{V_0}$$

If the plating bath is made up with tap water and the harmful ion is not present in the plating salts, which case is of frequent occurrence in ordinary plating, equation 11E simplifies to

$$(13E)\quad C_x = C_0 \left[1 + \frac{bn_1x}{V_0}\right]$$

### Practical Results

Equations 12E and 13E will be the ones most frequently used in computing concentration build ups. To use these equations we have to know the evaporation rate per rack plated. This is easily obtained where continuous replenishment is used by hook-

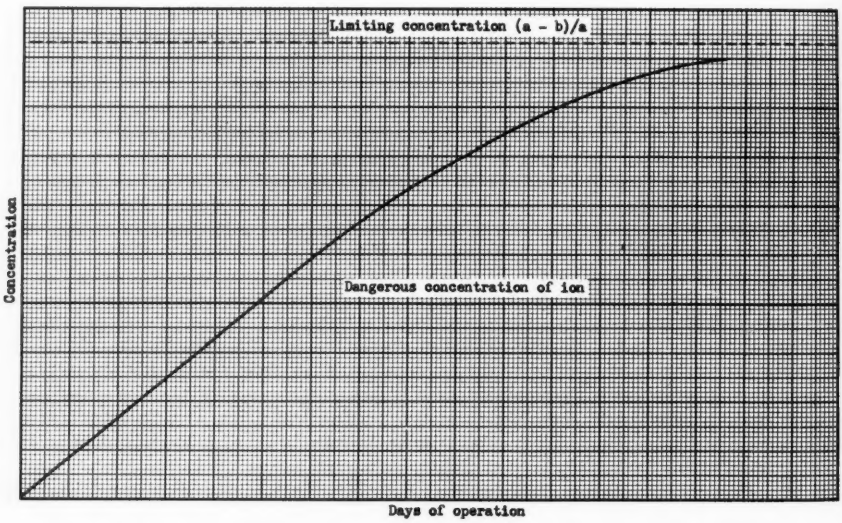
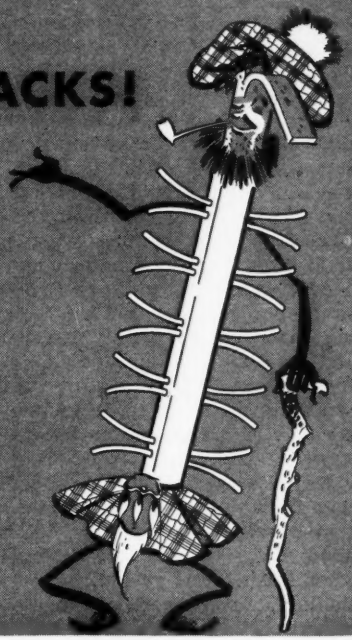



Fig. 2—Graph showing concentration of solution plotted against days of operation.

# It pays to be CANNY

## ABOUT PLATING RACKS!



WANT TO REDUCE frequent recoating of plating racks and fittings? Want a tough, flexible coating that can be speedily applied in your own shop? Want to avoid waste deposits of valuable metal on racks and fittings? Then look at the record of Unichrome "Air Dry" Rack Coating—established in *all* types of plating shops under the toughest operating conditions.

**ONE COATING FOR ALL PLATING WORK.** "Air Dry" is unaffected by hot alkaline cleaners, acid dips, hard chromium solutions and sulphuric or chromic anodizing solutions.

**SAVES RECOATING TIME AND MATERIAL.** Racks coated with "Air Dry" have gone through as many as 500 to 1000 severe cycles without any change in their original condition.

**WITHSTANDS REPEATED FLEXING AND BENDING.** Prevents rack surfaces from being accidentally exposed—saves waste of metal that might be deposited at uncovered spots.

**WITHSTANDS WEAR AND TEAR OF SHOP HANDLING.** Reduces the need for recoating—yet if the coating should be damaged in process, that portion can be patched without recoating the entire rack.

**FAST, SIMPLE DIPPING PROCEDURE.** In dipping, "Air Dry" is free-flowing—covers and adheres to the contours of the most elaborate rack, without creating bridges or air pockets.

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ing a water meter onto the replenishment line. The reading of the water meter gives the daily amount of water used in replenishing and this divided by the number of racks or pieces plated daily gives b, the evaporation rate. If intermittent replenishment is used, then the evaporation rate can simply be obtained by inserting a yard stick into the tank when it is at proper operating level and measuring the depth of the bath. Keep a count of the number of pieces or racks plated until replenishment is needed to bring the liquid level back to proper height. Before replenishing, insert the yardstick into the tank and measure the solution height. If the volume of the plating tank at proper operating level is known (this is easily found by measuring the tank length times depth times width divided by 231 gives volume in gallons) then the amount of plating bath evaporated during the run is $V_o$ multiplied by 1 minus the liquid level when bath needs replenishment, over the liquid level when bath is at proper operating level. This value divided by the number of racks or pieces plated gives the evaporation rate, b, per piece or rack plated. A practical example will illustrate this: A plating bath has a volume of 100 gallons at the proper operating depth which is 24 inches. After 100 racks have been plated the depth of the bath as measured by the yardstick is 22 inches. What is the evaporation rate? The evaporation rate

$$b = \frac{100\ (1 - 22/24)}{100} = .084 \text{ gallons}$$

per rack.

The other factor that must be known is the concentration of the harmful ion in the tap water. This can readily be obtained from your local water supply company by asking for an analysis of the water supply. This is usually supplied free of charge. If you cannot get it this way, a reliable chemist will have to be called in to take a sample of the water supply and analyze it for harmful ions. Drag-out when small as compared to the evaporation rate need not be known as it can be neglected, since b will be much larger than a. However, if it is considerable it should be determined by any one of the available methods.[8]

We give an example of the use of equation 13E in an application to bright nickel plating.

A bright nickel plating bath started with tap water has a volume of 1,000 gallons at proper operating level 48 inches. After a 1,000 racks go through it, the level drops to 42 inches and the water must be replenished. The daily production of the tank is 5,000 racks. The water used in making up the tank and in rinsing contains copper ion to the extent of 1 part per million (1 milligram per liter) due to a copper sulphate treatment to eliminate algae in the water. The particular bright nickel solution is sensitive to 10 milligrams per liter of copper and will go bad when that concentration of copper is reached in the bath. In how many days will the plating bath go bad?

We take equation 13E and solve for x getting

$$x = \frac{(C_x - 1)}{C_o} \frac{V_o}{bn_1}$$

$C_x = 10$, $C_o = 1$, $V_o = 1{,}000$, $n_1 = 5{,}000$ and

$$b = \frac{1{,}000\ (1 - 42/48)}{1{,}000} = .125$$

Substituting we get

$$x = \frac{(10 - 1)\ 1{,}000}{.125\ (5{,}000)} = 14.4 \text{ days.}$$

Or, in other words, on the 15th day of operation the bath will develop a cloud or go bad because of the pres-

# WAR PRODUCTION DEMANDS DEPENDABLE BLACK FINISH FOR STEEL PARTS

Critical war parts must not be allowed to pile up at the finishing tanks because operations stall or break down.

Don't take chances. Be guided by the experience of leading armament manufacturers. Install the guaranteed Du-Lite Process of Black Oxide Finishing for Steel. Du-Lite has been proven a superior finish, durable, rust resisting, and so easy to operate that we can train your men in a very short time to turn out volume production of highest quality.

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ence of copper in a concentration of 10 parts per million.

This is but one example of the use of this equation. Other examples will be considered in a later chapter.

[1] This assumption has been shown to be a good one in connection with the writer's work on drag-out. See article on drag-out in this series.

[2] The fact that both equations approach the limit at the same rate can be verified by simplifying the equations as illustrated and taking the derivatives. The slope of both curves is approximately the same.

[3] The method of Conley, Kushner or Hogaboom are recommended.

---

**"Protective Concealment."** Camouflage for industrial plants, factories, buildings, railroad yards, airfields, conspicuous landmarks and transportation systems are described in a profusely illustrated 68-page booklet titled "Protective Concealment" issued by the Office of Civilian Defense. The booklet was prepared by the War Department under the direction of the Chief of Engineers, U. S. Army, by the Engineer Board, with suggestions of the National Technological Civil Protection Committee.

Accompanied by graphic sketches the booklet describes the technique of precision bombing with charts showing the elements of time necessary for precision bombing and illustrations of the trajectory of the bomb from the time of its release until it strikes the target.

The booklet states that at least five circumstances combine to oppose the bomber and simplify the defender's concealment problem and adds that these are "high altitude, the oblique view required to pick up the target, the brief period available for aligning the bomb sight, the possibility of haze or thick weather, and the obscurity of nightfall."

Although an enemy may have accurate maps and photographs he must rely upon visual identification of the target or a close landmark in order to properly aim and release the bombs. Any concealment measure that serves to reduce the visibility or confuse the identity of a target may therefore be of considerate value. Accordingly, the booklet describes the modes of attack with emphasis upon such considerations as distance from bases, altitude, speed, visibility and possession of photographs. Included are "Aids to Concealment" such as dummy or decoy installations, the use of smoke and artificial fog such as provided by smudgepots, and so on.

The final appendix titled "Materials for Protective Concealment" is a catalog of specifications and uses for paints, fabrics, and other items suitable for camouflage.

Distribution of the booklet is restricted. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 25 cents per copy.

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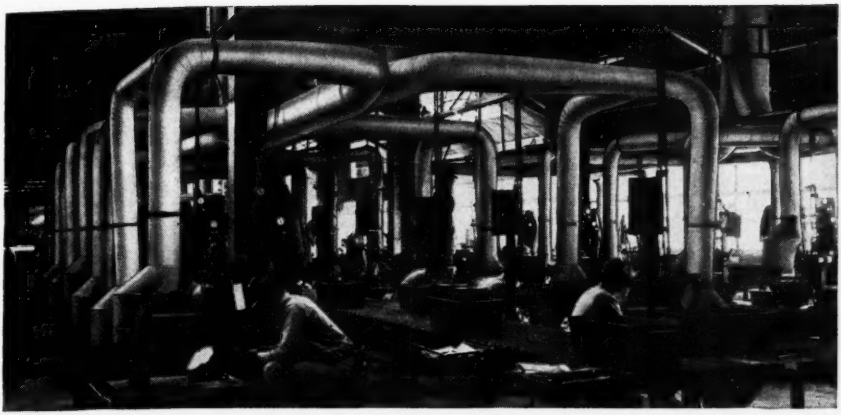
**The Physical Examination of Metals, Vol. 2, Electrical Methods.** Bruce Chalmers and A. G. Quarrell have collaborated on Vol. 2 of the book, "The Physical Examination of Hetals," which deals with electrical methods. This book is being published by Longmans, Green & Co., 55 Fifth Ave., New York City, and is available at $6.00 per copy.

One of the results of the rapid development of the application of physical methods to the examination of metals is that many investigators have become too specialized, tending to regard the particular method with which they are most familiar as of universal application. It is evident, however, that although different methods may sometimes overlap, they are to a large extent complementary, not only to each other, but also to the more generally used "metallurgical" methods. In presenting in one volume an account of those techniques which may be broadly classified as electrical, the authors have attempted to indicate the scope and limitations of each of the methods described, doing so, where possible, by reference to successful applications. At the same time, no attempt has been made to include a complete bibliography of the subject.

It is hoped that this volume will be useful not only to those concerned with the development of new or more specialized tests for metals and metallic components, but also to the much greater number who, through lack of readily available information, are forced either to accept without discrimination the results of test they do not fully understand, or else to forego the advantages of the most modern methods.

---

**Wings of Victory.** A beautifully illustrated catalog entitled "Wings of Victory" is now being issued by Berry Brothers, Inc., 211 Leib St., Detroit, Mich. Some of the most beautiful color pictures of aircraft of all types are reproduced in this booklet and should prove to be of interest to everyone. A copy will be sent free upon request.



*Name and location of plant not revealed at request of Ordnance District Office*

# From 100,000 C. F. M. in 1940 to 3,650,000 C. F. M. in 1942

## SUCH AN INCREASE IN THE USE OF KIRK & BLUM DUST *and* FUME CONTROL SYSTEMS IS PROOF OF THEIR SUPERIORITY

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Kirk & Blum Engineers will make a survey of your plant and submit plans and recommendations for the complete elimination of heat, dust and fumes. Accumulated experience of more than 35 years in designing and installing dust and fume control systems enables K. & B. Engineers to speak with authority.

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"Cooling Systems for the Glass Industry"
"Data on Kirk & Blum Production Facilities"

# *Extinguishing System Reduces Dip Tank Fire Hazard*

***A properly engineered extinguishing system offers maximum protection against fire hazards.***

IN the finishing departments of many large plants the fire hazard is minimized by having the paint storage and mixing sections housed in an adjacent, though separate building, or isolated by means of fire-proofed walls and ceiling and with fire doors kept closed, except when found necessary for workers to enter or leave the enclosure. At one large stove manufacturing plant, the Kankakee plant of the Florence Stove Company, extra precautions are taken in one of the rooms of the finishing department.

In the fire-proof room where certain parts of stoves are Japanned, the dipping tank is 32 ft. long, 3½ ft. wide, and 6 ft. deep, with a surface area of about 110 sq. ft., the cubic capacity being some 3,000 gallons. To this is added a surface of about 206 sq. ft. of drip boards. As a measure to eliminate the fire hazard, this room is protected by a piped automatic chemical fire extinguisher system, manufactured by American-La France-Foamite Corporation.

After leaving the dipping tank, in which the contents are kept from settling by constant agitation through a recirculating pump, the work is permitted to drain for about seven minutes as the overhead conveyor carries it back and forth above the drip boards (approximately 200 ft. long) before it passes into the baking oven. During this somewhat prolonged draining period, much of the inflammable liquid passes off, going far towards eliminating the possibility of fire or explosion within the oven.

At the edges of the dip tank are flared nozzles with ¾-in. diameter orifices; while along both sides of the drain board, at intervals of about 6 ft. 8 in. are 1½-in. deflector nozzles, having ⅝-in. diameter orifices; and running across the ceiling of the room, but clear of the overhead conveyor, is a series of five pairs of 1½-in. distributor head nozzles having ¾-in. diameter orifices.

These nozzles are the outlets from four distinct lines emanating from four 160-gallon capacity Foamite units, spotted outside the door of the dipping room in an adjoining room.

On the ceiling too, are located two heat activated devices. Each of these consists of a light metal bulb, or air

chamber, entirely enclosed except for a short tubing outlet fitted with a compression type coupling. To this is attached a copper air tubing which forms the connection between the heat activated device and a thin metal diaphragm mounted in the release box. In the tubing system a vent is installed—a small metal fitting containing a special packing. Its function is to take care of any normal temperature changes, and allow the air pressure in the heat activated device to correspond to the surrounding atmosphere.

In case of fire, the greatly increased heat from the flame expands the air within the device too rapidly to escape through the copper air tubing, and the ensuing pressure starts the mechanism which causes the flow of fire foam to completely cover the drain boards and the dip tank area; while at the same time the contents of the dip tank is automatically emptied into an underground tank through an 8-in. valve, which under normal conditions is held in closed position by a fusable link located above the dip tank.

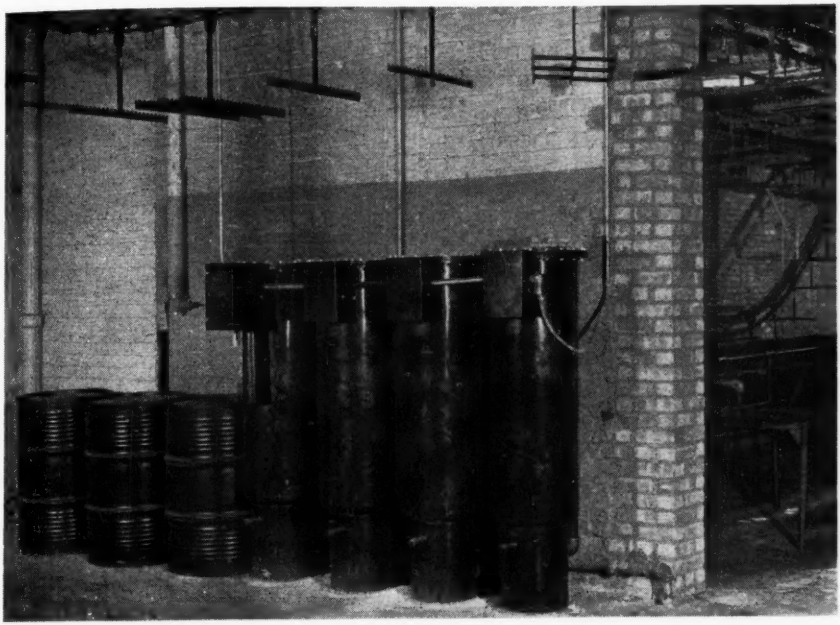

Fig. 1—View of dipping room showing arrangement of piping along sides of dip tank and drain boards

Automatic foam protection for dip tanks and drainboards is computed on the basis of providing a minimum blanket of 6 inches of fire foam on the liquid surface of the dip tank, and a minimum blanket of 2 inches of fire foam on the drainboard. Fire foam, when discharged on a blazing liquid spreads over the liquid surface and establishes a tight blanket which cuts off the supply of fire nourishing air, smothers out the flames and pre-

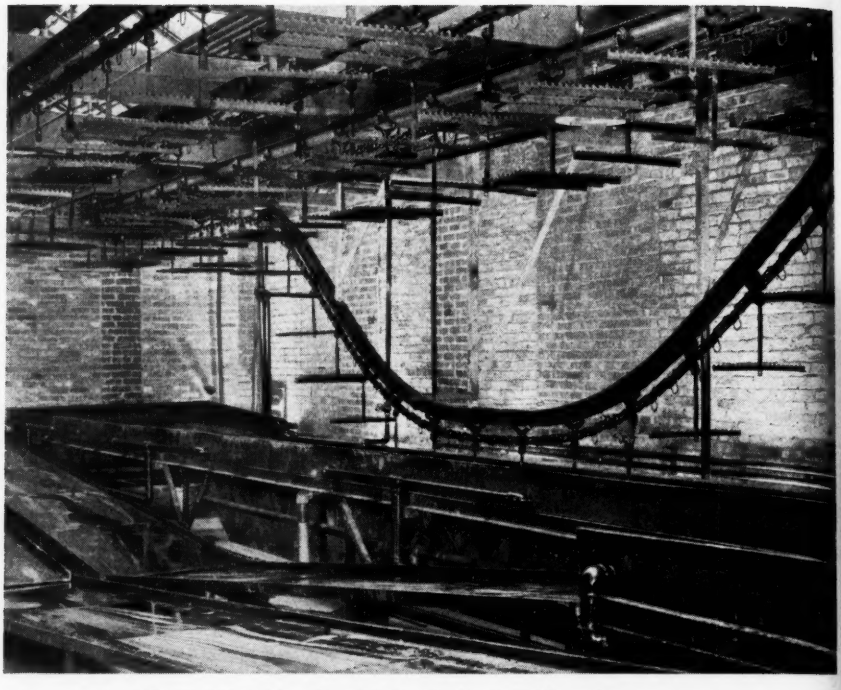

Fig. 2—Row of foamite units located just outside of dipping room

vents re-ignition and reflashes. The chemical solutions in the Foamite System expand about ten-fold when they are combined to make fire foam, which action takes place within the cylinders when the system operates.

---

**Binks New Catalog No. 80,** published by Binks Manufacturing Company, 3114-40 Carroll Ave., Chicago, Ill., in its customary red cellophane covers and showing everything necessary for successful spray painting and finishing, is now being issued by the company.

The major part of the company's business at the present time is war production work, consisting of complete spray painting installations, paint circulating systems, spray booths of both dry and water wash types, exhaust systems, and automatic spray finishing equipment for the coating of bombs and shells. Views of many large installations are included in the book.

A copy of this finely printed and beautifully illustrated catalog will be mailed to anyone interested who will write on his company's letterhead.

**Data on Production Facilities.** An interesting and informative catalog designated as "Data on Production Facilities" is now being issued by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio. The catalog presents to manufacturers, who must of necessity sub-contract certain sheet metal parts and assemblies, a complete list of the machines that comprise the Kirk & Blum facilities for prompt execution of sheet metal, sheet steel, and light plate fabrication. The name and size of each piece of equipment is also listed.

Throughout the catalog are many illustrations of the various sheet metal parts and large assemblies that have been fabricated under contract for many leading national industries.

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# BATCH CLEANING
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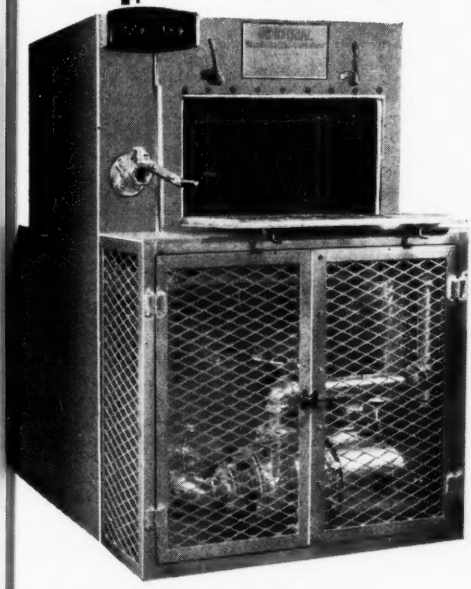

This rotating table, cabinet model washing machine (illustrated) cleans 150 lbs. of metal parts in 60 seconds. Parts are revolved on heavy mesh table so that jets from top, bottom, and sides clean every surface with powerful pressure spray. This machine uses alkaline cleaners or petroleum solvents — saves 90% of either as compared with dipping methods.

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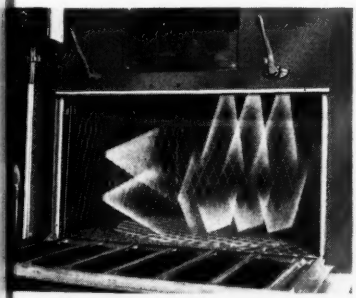

*Left:* Close up view of cabinet with door open, showing rotating mesh table. Large parts are handled directly on table. Small parts are revolved in baskets. Note high pressure spray from top, bottom, and sides.

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# World's Largest Spray Booth for Bombers

SOON, in one of the big aircraft plants, the world's largest water-wash spray booth will be in operation. It will be 152 ft. long, 100 ft. deep, and 31 ft. high and was designed and built by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio, for painting large bomber parts and complete planes.

The illustration shows one of the eight compartments that will be assembled into the mammoth installation, as compared to the size of an ordinary industrial spray booth. These compartments will be assembled in pairs, side by side, with an intervening six-foot space between pairs to accommodate motor-driven accordion partitions—31 ft. high and having a 100 ft. span. Folding partitions are also mounted on the ends.

The booth's design has several advantages. Because of its sectional construction and folding partitions, it can be used as one enormous spray booth with 15,200 sq. ft. of floor space or can be cut into two, three, or four booths, each large enough to accommodate a bomber's fuselage less its wing surfaces. The maximum booth space will permit a complete large size bomber to be wheeled in for painting.

There are many interesting angles in the remarkable efficiency of the exhausting facilities of this equipment. The wash-down curtain in each compartment is 20 ft. high and water cascades over it at the rate of 24,000 gallons per hour. That means a water fall of 192,000 gallons an hour for the complete installation — a virtual Niagara. Air is drawn through the curtain of water in each compartment by two fans, each 48 in. in diameter and each driven by 7½ h.p. motor, developing a capacity of 31,000 cu. ft. of air per minute for each water-wash compartment. Thus 62,000 cu. ft. of air per minute are drawn through each of the eight sections. With the entire installation in operation, the 16 fans will move a total 496 000 cu. ft. of air per minute. This exhaust system assures the complete removal of spray vapors from all parts of the booth, even on the largest painting jobs.

The design and construction of this giant spray booth by DeVilbiss marks a long forward step in speeding the bomber output in achieving the goal of mass war-plane production.

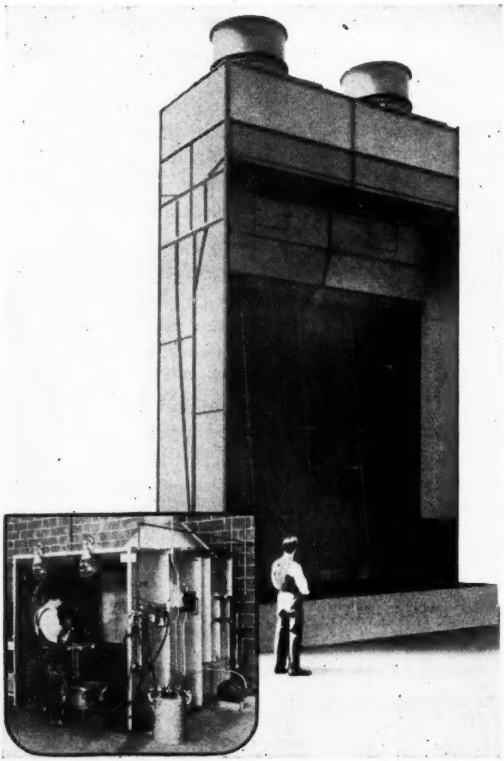

Illustration showing a view of the world's largest spray booth designed for the finishing of bombers.

*Facts* about
# Metal Polishing

## Preparation of Glue

### Selection

The use of a good grade of animal hide glue is essential. Bone glue, fish glue, and cold glue preparations are relatively inefficient.

### Mixing

Mix by weight only and never heat more than a three hours' supply at any time. For average conditions in the polishing room the following table of mixtures should act as a guide for setting up wheels.

| *Size of Alundum Grain* | *% Glue* | *% Water* |
|---|---|---|
| 24— 36 | 50 | 50 |
| 46— 54 | 45 | 55 |
| 60— 70 | 40 | 60 |
| 80— 90 | 35 | 65 |
| 100—120 | 33 | 67 |
| 150—180 | 30 | 70 |
| 220—240 | 25 | 75 |

### Soaking

Soaking the glue allows it to dissolve more readily on heating. Use cold pure water and soak:

Ground glue—One hour or more
Flake glue—Six hours or more
Cake glue—Twelve hours or more

### Melting of Glue

The glue should be melted in a water-jacketed heater. When the wheels and grain are preheated, apply the glue at a temperature of 140° F. With wheels and grain at room temperature, use glue at 160° F. Keep a thermometer in the gluepot as a constant check on temperature, even though the pot is regulated by a thermostat.
It is important that all equipment used be kept clean.

**NORTON COMPANY • WORCESTER, MASS.**

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NORTON ABRASIVES

# *Finishing Facts*

## Army Develops New Mess Tray

The Army has designed a new mess tray made of chrome plated, sheet steel, which replaces stainless steel, a critical material, the War Department announced recently.

More than a million pounds of stainless steel will be saved in this year's procurements of the new type tray, according to the Quartermaster Corps designers of the item. The tray has a high luster, is pleasing in appearance, is rustproof and does not scratch. It has six compartments, including space for a cup of coffee or a bowl of soup.

The enlisted man, when served food on the cafeteria plan, can eat all mess items from the tray, and will require the use of no chinaware aside from a cup for coffee or a bowl for soup. Thus the widespread use of a tray of this type will eliminate a major portion of the loss hitherto encountered from chinaware breakage.

## Infra-Red Lamps Cut Armature Baking Time to One-Third

Radiant drying lamps, replacing steam heat, have reduced the drying time for 12-in. armatures from 18 hours to 5 hours in a small industrial repair shop. One-hundred-twenty infra-red Westinghouse 250-watt reflector drying lamps are arranged in tubular form in two equal adjustable banks. Three 10 kw. sections, each consisting of eight groups of five lamps, permits three armatures to be baked simultaneously or individually.

Heating temperatures range between 240 deg. and 260 deg. F. as compared to 185 deg. to 200 deg. F. with steam heat. Drying time varies from three to nine hours for armatures from six to 24 in. in diameter. Power supply is single phase, 3-wire with individual 30 ampere switches controlling the 24 five-lamp

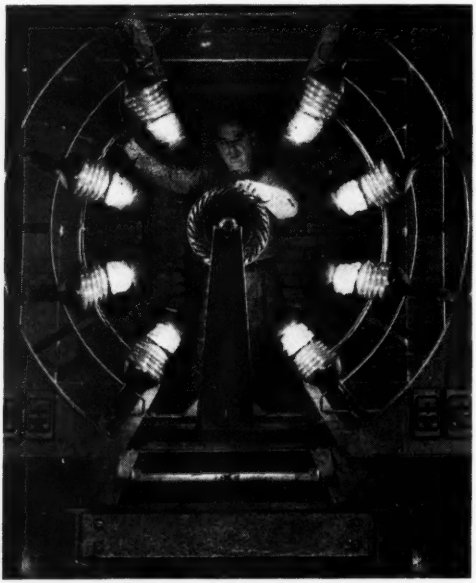

Illustration showing an armature in the process of being baked

# How to increase the efficiency of polishing wheels!

*Tips on "TP"*

NOW that it's vital to get maximum efficiency from every tool, proper preparation and care of polishing wheels is more important than ever.

Make sure the abrasive grit size selected is correct for the particular job at hand. Use a good glue graded at 115 millipoises or higher, preferably in ground form. Glue should be heated to 140° or 150°F. before applying, while temperature of wheel and grain should be at least 120°F. Roll the grain onto the wheel with moderate, even pressure. Make sure wheel is thoroughly dried and cured before using. At a temperature of 80°F. and a relative humidity of 50%, forty-eight hours will do the trick. After drying, balance the wheel carefully in order to eliminate pounding. In the actual polishing operation, stick to a speed of 7000 to 7500 surface feet per minute for general work, as higher speeds soften the glue.

These are just a few tips for increasing the wartime efficiency of your polishing wheels. For fuller information, write for the "ALOXITE-TP" MANUAL OF MODERN POLISHING PRACTICE.

*Aloxite "TP" Grain is always uniform*

CARBORUNDUM
ABRASIVE PRODUCTS

**THE CARBORUNDUM COMPANY • NIAGARA FALLS, N. Y.**

REG. U. S. PAT. OFF.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)

groupings, a total load of 30 kw.

The wall construction of the old steam oven remained intact in the revamping. The only changes made were the removal of the steam pipes, the doors and the venting in the roof. Each bank of lamps is supported from the roof on bar door slides, which permits the lamps to be adjusted to the proper distance or seven inches from the armature surface.

# Du Pont Developments

Minerals are contributing to the all-out Victory effort of the chemical industry. Vast quantities by truck, train, and ships are pouring into chemical plants, there to be transformed into vital products necessary for winning the war. They come from within the borders of the United States and from the sister republics of Latin America. Side by side with the transformation of minerals into products for military needs, is the constant development of new processes and methods resulting in savings of strategic materials of which there is a shortage.

Only recently, E. I. du Pont de Nemours & Company, Wilmington, Del., announced a more economical electrolytic process for plating strip steel with tin, which will result in conserving both tin and electric power. It employs a mildly acid solution said to eliminate "sludging" and the consequent waste common to many electro-tinning methods. Since a thinner, more uniform coat can be applied to strip steel electrolytically than by the conventional "hot dip" method, it results in savings of from 40 to 65 per cent of the tin used.

**Plastic Molding.** A comprehensive study of plastic molding, written by D. A. Dearle, is now being published by Chemical Publishing Company, 234 King St., Brooklyn, N. Y. Copies are available at $4.00 each.

The rapid and almost phenomenal growth of plastics during the past few years has created a vital need for men trained in the industry. At the present time the dearth of experienced personnel is steadily becoming more acute and as the plastic molding field continues to expand, this need is bound to make itself manifest. Tremendous opportunities are now open to those individuals who wish to enter this vast expansion and it behooves the enterprising graduate to gain whatever knowledge he can pertaining to the various phases of the industry.

The object of this course is to give the student or layman a general knowledge of plastics and the numerous phases of manufacturing methods. It is decidedly comprehensive in treatment of the various subjects and does not deal with the chemical formulations of the innumerable plastic materials now available. Many books have been written which fully describe the chemical analyses of the plastic compounds and hence the course has been devoted more to the practical aspects of the industry.

While a knowledge of applied mechanics, elementary algebra, and trigonometry will be quite helpful to the reader, such prerequisites are not necessarily essential to thorough comprehension of the course. Efficient molding of plastic materials is based on engineering principles, as is true in any large industry, but with the proper application of practical knowledge, the student should be able to gain a firm foundation of the entire molding process and ultimately be competent to accept a position of responsibility in the industry. In this respect it is suggested that the reader avail himself of every opportunity to actually see the molding plant in operation, and attempt to co-ordinate these observations with the corresponding reading matter in the book.

**Priorities Mobilize Production for Victory.** Manning, Maxwell & Moore, Brdigeport, Conn., makers of pressure gauges, safety valves, industrial thermometers, and globe valves, are distributing a new booklet entitled "Priorities Mobilize Production for Victory."

This is a unique, 16-page booklet explaining priorities and how to understand and use them. It has been prepared by this company and published in an effort to assist its jobbers and its salesmen and customers.

To "Keep 'em Flying" you must "Keep on Buying" War Bonds and Stamps.

# EVERY MAN COUNTS FOR MORE

## when SKILSAW DISC SANDERS grind raised welds!

Know why so many SKILSAW DISC SANDERS are used in War Production plants? The answer's simple—these more powerful, easier-handling tools *are faster!* They grind down welding beads, remove fins and scale, file, sand, buff and polish on metal, wood, stone, tile and compositions. That's why SKILSAW DISC SANDERS are *preferred* in aircraft, tank and War plants everywhere . . . to make every man and every minute count *for more!*

6 POWERFUL MODELS for all finishing on flat or curved surfaces . . . for use with grinding wheels, sanding discs, rubbing pads, wire brushes and polishing bonnets. Ask your distributor to demonstrate SKILSAW DISC SANDERS on your toughest surfacing jobs.

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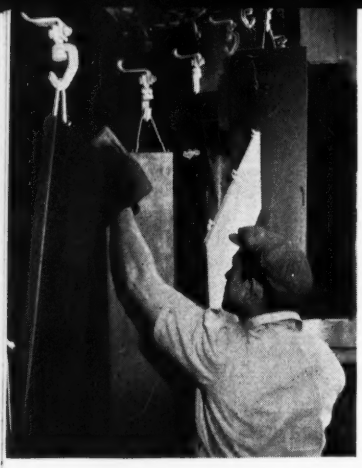
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★



# News OF THE INDUSTRY

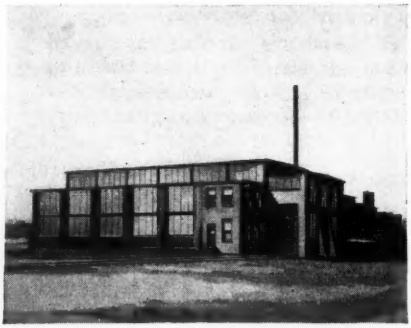
## U. S. Stoneware Acquires Prominent Mechanical Rubber Goods Plant

The Chamberlain Engineering, Ltd., a unit of the United States Stoneware Co., Akron, Ohio, recently purchased the business and mechanical rubber goods factory of the Lower Rubber Mfg. Co., Ravenna, Ohio. The plant was built in 1938 and its equipment is thoroughly modern.

This new Lower Plant will be used principally for milling, calendering, extruding and molding operations on the "Tygon" series of synthetic rubber-like materials. Provision will also be made for the production of U. S. Stoneware's "Duralon," the synthetic resin with a polymerized furfural orthosilicate base, as a substitute for hard rubber in all extruded and molded shapes.

The old and varied mechanical rubber goods line of the former Lower Company will be retained. Many new rubber items will also be produced for the Chemical Warfare Service and other war agencies.

The technical facilities and sales organizations of the two companies will be merged. Mr. M. S. Lower, former president of the Lower Rubber Mfg. Co., will serve as general manager of the plant, which will be operated as the Lower Rubber Mfg. Division.



Newly Acquired Plant of United States Stoneware Company

## Nat Armel Appointed Sales Manager

Nat Armel has been appointed sales manager of both Glidden Industrial and Nubian Division of The Glidden Company, 11001 Madison Ave., Cleveland, Ohio, and will be in charge of the sales and service departments for that division, it was announced by J. L. Noon, manager of industrial and transportation sales. Mr. Armel will assume his new duties immediately.

## Thompson Transferred to Pennsylvania Salt Industrial Cleaner Division

M. A. Thompson, who has been in the Heavy Chemical Sales Division of the Pennsylvania Salt Manufacturing Company in the Detroit area since March, 1938, has been transferred to the Industrial Cleaner Division. He started with the company in 1934, spending his first four years in various plants. Although assigned to the Heavy Chemical Division, he has assisted in the sale of Pennsalt Cleaners and is well known in that field.

**TO EXECUTIVES:**

# NOW YOU CAN HELP

## *Even More...*

**New Treasury Ruling Permits Purchases UP TO $100,000 In Any Calendar Year of Series F and G WAR BONDS!**

This is not a new Bond issue and not a new series of War Bonds. Thousands of individuals, corporations, labor unions, and other organizations have this year already purchased $50,000 of Series F and G Bonds, the old limit. Under the new regulations, however, these Bond holders will be permitted to make additional purchases of $50,000 in the remaining months of the year. The new limitation on holdings of $100,000 in any one calendar year in either Series F or G, or in both series combined, is on the cost price; not on the maturity value.

Series F and G Bonds are intended primarily for larger investors and may be registered in the names of fiduciaries, corporations, labor unions, and other groups, as well as individuals.

The Series F Bond is a 12-year appreciation Bond, issued on a discount basis at 74 percent of maturity value. If held to maturity, 12 years from the date of issue, the Bond draws interest equivalent to 2.53 percent a year, computed on the purchase price, compounded semiannually. The Series G Bond is a 12-year current income Bond issued at par, and draws interest of 2.5 percent a year, paid semiannually by Treasury check.

SAVE WITH

**War Savings Bonds**

This space is a contribution to America's All-Out War Program by PRODUCTS FINISHING

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## Westvaco Issues Card on WPB Classifications

For the convenience of chemical buyers, Westvaco Chlorine Products Corporation has issued, on a handy letter-size card, a summary of WPB Allocation Classification Order Numbers.

On the face side is a summary of the instructions issued by WPB on the Allocation Order Number system to be used on all purchase orders dated July, 1942, and thereafter. On the reverse side is a tabulation of the order numbers and classifications covering every branch of military and civilian goods.

Copies of this desk-card may be obtained without charge from Westvaco Chlorine Products Corporation, 405 Lexington Avenue, New York, N. Y.

## Benwood Linze Acquires Fore Electric Company

The Benwood Linze Co., St. Louis, Mo., designers, engineers, and manufacturers of electrical rectifiers and rectifier-transformer assemblies announces a further step in their over-all program of expansion, namely, the purchase of the Fore Electric Co., located at 4800 Delmar Blvd., St. Louis, Mo. The purchase includes all of the company's equipment, inventory, assets and trade name. All facilities have been moved to the plant of The Benwood Linze Co., at 1815 Locust Street.

The Fore Electric Co. was founded in 1917 under the direction of Albert Wehmeier, a well-known figure in the automotive and electrical industry for many years and who today is the retiring president of the firm.

The Benwood Linze Co. will continue to manufacture and distribute the products of the Fore Electric Co., including replacement parts for same.

The purchase of the Fore Electric Co. substantially augments the corporate structure of The Benwood Linze Co. and its wholly owned subsidiary, the B-L Electric Manufacturing Co., further enabling the parent company to better serve the War Program and industrial concerns in general.

## Robert E. Mason to Represent "Lightnin" Mixers in North and South Carolina

The Mixing Equipment Company, 1038 Garson Ave., Rochester, N. Y., has announced the appointment of Robert E.


**PHILLSOLV**— *(Tetrachlorethylene Base)*

***The Perfect Degreaser Solvent***

***IS AVAILABLE FOR WAR WORK***

**PHILLSOLV, a tetrachlorethylene-base solvent,** boils at 249° F., and is insoluble with water. Any moisture introduced into the bath or induced by atmospheric conditions is constantly dissipated in the form of steam. This steam, however, carries over very little solvent, as the solvent vapors are 5.7 times heavier than air and maintain an even 249° temperature.

This constant dissipation of moisture lessens the tendency towards formation of hydrochloric acid by hydrolysis within the unit, and the resulting corrosion of the tank and the work cleaned, which is a common objection to other chlorinated solvents with vapor temperatures below that of water (212°). Summarizing, PHILLSOLV greatly reduces all corrosive action on metal parts cleaned therein.

**PHILLIPS MANUFACTURING CO.**

**344½ W. Huron Street** **Chicago, Illinois**

***DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE U. S.***

Mason, of Charlotte, N. C., as the company's representative for the states of North and South Carolina. Mr. Mason, who is well acquainted throughout the mills and plants of the Piedmont area,

Robert E. Mason

as well as the coastal regions he will cover, will handle the widely recognized "Lightnin" propeller and turbine type mixers.

Mason is a graduate in electrical engineering from the University of North Carolina and a veteran of more than ten years in sales engineering in the electrical and process equipment field.

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## Watson-Standard Completes Exhaustive Laboratory Study of Specification Coatings

Finishers accustomed to using coatings specifically engineered for definite methods of application have encountered some difficulty with the new Government Specifications. These apparently were drawn without regard to method of application and in many cases the Government formulas are unsuited to the shop conditions for which they were intended without considerable modification.

The Watson-Standard Co., 225 Galveston St., Pittsburgh, Pa., announces completion of an exhaustive laboratory study of the problem and the development of a series of formulas which meet Government Specifications, but are engineered to specific shop conditions and methods of application.


★ PLANE PARTS
★ TANK PARTS
★ BOMB PARTS
★ SHELLS
★ GUN BARRELS

USE Hammond AUTOMATIC FINISHING MACHINES

MODEL-SB

**ROTARY AUTOMATICS**

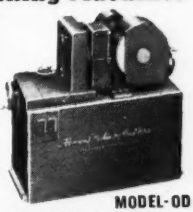
For Burring, Brushing, Polishing, Buffing of Plated or Base Metals

Step up production of Aircraft Engine Pistons, Valves, Hexnuts, Sparkplugs, etc.; Tank Track Pins, Engine Cylinder Liners, Carburetor parts, Gears, etc.; Shells and Shell Cases, Fuse Bodies, Fuse Caps, Striker Plates, Setting Sleeves, Timer Bodies, to name just a few of many items.

**Cylindrical Finishing Machines**

For 1/4" to 9" Outside Diameters

Aircraft Landing Gear Parts, Universal Joint Shafts, Pistons, Cartridge and Shell Cases, Burster Tubes, Trench Mortar Bombs, Machine Gun Barrels, Throttle Shafts, Tubing and Rods present a few of the numerous uses of the "OD" Machine.



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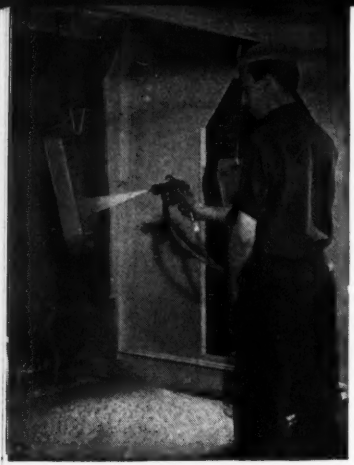


# New PLANT EQUIPMENT AND Materials

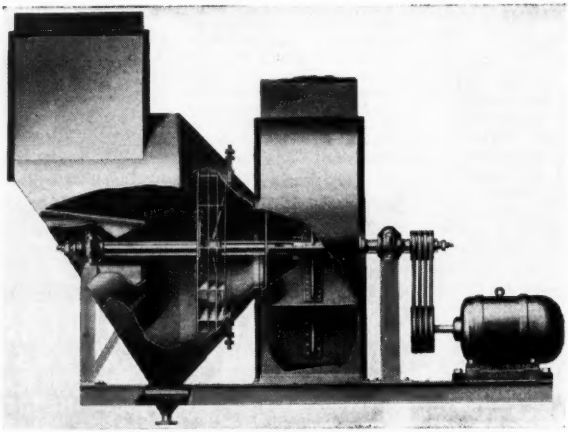
## Schneible FiltreFan

A unit designed for removing dust and fly ash from flues, kilns and furnaces, smelter stacks, and cupolas, to be known as the Schneible FiltreFan, has been introduced by the Claude B. Schneible Co., 3951 Lawrence Ave., Chicago, Ill. The unit consists of a combination housing on which is mounted a rejector wheel and fan wheel. These two wheels are located on a single motor-driven shaft. Solids are removed from gas streams by means of the rejector wheel, which throws the particles into a dead zone and hopper by centrifugal force. The dust particles do not come into contact with the wheel, thus eliminating wear on the wheel blades.

Dust-laden air or gas enters the scroll of the rejector wheel through a tangential inlet. The rejector wheel is caused to rotate by vanes, throwing the dust particles outward against the scroll, from which they travel to the discharging hopper. The cleaned air enters the periphery of the rejector wheel and is drawn toward the center between the side sheets and the vanes. Through an outlet port in the center, the air is drawn by a conventional fan wheel to be exhausted through an outlet duct.

Wheels, housings, and hopper are built of heavy steel plate. The combination housing is mounted on a single base, which includes the motor mounting. The housing is split horizontally in line with the motor-driven shaft to make the rotating assembly removable, the assembly being dynamically balanced. Anti-friction bearings and large shafting are said to prevent distortion of moving parts.

For high temperatures stack gas, the FiltreFan is equipped with a hollow water-cooled shaft with packing glands and water connections provided at both ends. If desired, jets can be placed in the refuser wheel housing. Water from these jets floods a portion of the scroll and hopper, thus protecting against abrasion and ensuring dustless removal of the solids.



Schneible FiltreFan

The Schneible Filtre-Fan is made in seven sizes to meet any conditions regardless of size of stack, kiln, cupola, or other source of fly ash.

## Roberts Burring Compound

According to a recent announcement, The Roberts Rouge Company, 904 Longbrook Ave., Stratford, Conn., has developed a burring compound in cooperation with the Osborn Mfg. Co., prominent brush manufacturer. The Roberts Burring Compound is designed to adhere to wire ends of wheels and thereby provide better and speedier burring methods.

The Roberts Burring Compound may also be successfully applied to hard sewed buffs, cord wheels, flat wheels, as well as to tampico and various wire brushes. Typical steel wire wheels performing a satisfactory job with the Roberts Burring Compound are 12 in. in diameter, wire gage from 0.005 to 0.010, with speeds from 1,800 to 2,400 r.p.m. The Roberts method of burring is said to be a decided innovation and a distinct addition to the war effort, since it eliminates in many cases slower and less accurate methods which involve hand filing and grinding.

## Brightboy Finetex Abrasive Wheel

The Weldon Roberts Rubber Co., Brightboy Industrial Division, Newark, N. J., announces the addition of a finer texture wheel to its Brightboy line of rubber-cushioned abrasive products for use in metal finishing operations. The wheel, which is known as the Brightboy Finetex, is said to be especially adapted for the more delicate type of work in producing special finishes and polishes.

The Brightboy Finetex Abrasive Wheel is available in small sizes of from ½ to 1 inch in diameter and in large sizes of from 1½ to 5 inches in diameter.

Brightboy Finetex Abrasive Wheel

## Glyco "Theop"

Ethyl cellulose can be plasticised for sheeting, molding, extruding, and for use in lacquer films with a new plasticizer known as "Theop," developed by the Glyco Products Co., Inc., 230 King St., Brooklyn, New York.

Theop is a light-colored, synthetic ester which is commercially available. It is said to be non-volatile, non-drying, non-corrosive and is completely compatible with ethyl cellulose. According to the manufacturer, it has excellent solvent action and will dissolve ethyl cellulose in the cold.

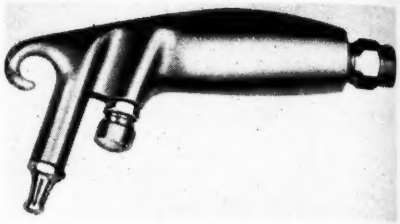
In ethyl cellulose formulations for molding, 30 per cent Theop is said to exhibit no exuding, discoloration, or other deleterious characteristics, either initially or on extended aging tests.

AUTOMATIC POLISHING & BUFFING MACHINES
Packer-Matic
THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.
MEETING
WAR PRODUCTION DEMANDS
POLISH and BUFF Automatically

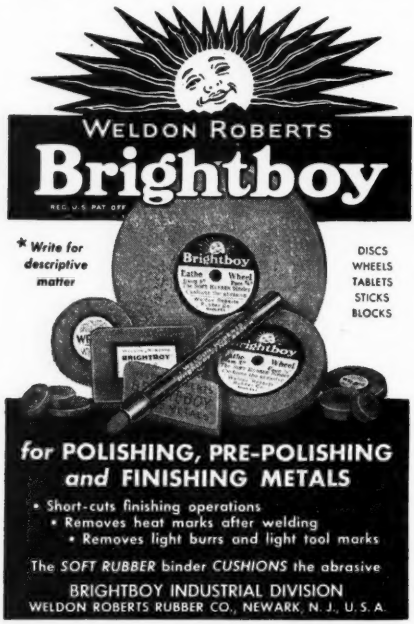
## Paasche Airduster and Cleaner

A new type airduster to speed cleaning and dusting of tools, machines, parts, instruments, and pieces to be painted is announced by the Paasche Airbrush Company, 1910 Diversey Pkwy., Chicago, Ill. The tool is said to be ideal for such jobs as cleaning dust from surfaces to be painted, blowing filings, chips and shavings from machined metal parts, cleaning tools, machines, jigs, motor armatures, and so on.

The Paasche Airduster and Cleaner operates on air pressure, consuming from 5 to 15 c.f.m., depending upon nozzle used. Many places ordinarily inaccessible can be reached easily and cleaned with this gun. Three-inch and six-inch extensions, which may be coupled together, increase its utility. The air gun is ruggedly constructed of brass for hard use. Handle and trigger afford a natural easy grip. Hanger hook is provided so that gun may be kept handy for instant use.



Paasche Airduster and Cleaner

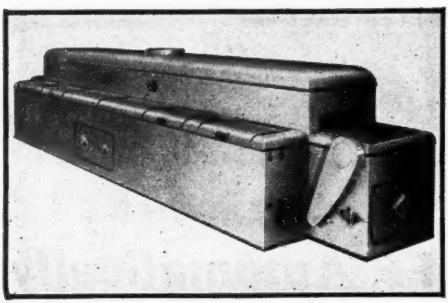





## Hydro-Tex Apron

An impregnated heavy cotton material manufactured as an apron to be known as Hydro-Tex is now being marketed by The Hydro-Tex Corporation, 564 W. Adams St., Chicago, Illinois.

The Hydro-Tex Apron is said to provide extra heavy duty and strength. It is impregnated with a synthetic waterproofing solution that is said to make the material impervious to water and oil. It is not coated, but impregnated, therefore there is nothing to wear off. To give double durability and double wear, a reinforced patch is sewed on the front where there is most wear and tear. It is full sized, being cut 35 in. by 45 in. long. The Hydro-Tex Apron is available with separate ties so it can be adjusted for any length or width. This apron may be used in many specialized as well as general industries.

**HYDRO-FLOW**
**Industrial Washing Machines**

Streamlined design. Hidden motors, pumps and pipes are easily assembled. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Monorail, Belt or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

**International Conveyor & Washer Corp.**
*Write for circular.*
640 E. FORT ST. DETROIT, MICH.

## Lyon Tool Stand

A new tool stand recently announced by Lyon Metal Products, Incorporated, 3093 Clark St., Aurora, Ill., is designed for efficient individual storage of tools for workers on one, two, or three shift operations. The Lyon Tool Stand is useful around production machines and toolrooms as a toter up to the job. It can be used along assembly lines for a parts and tool transporter for maintenance men and as an equipment carrier for inspectors and for stock picking and transportation.

Lyon Tool Stand

The drawers in the Lyon Tool Stand can be locked to guard against thieving of important tools. The drawers feature easy sliding and flat key locks.

## "Alfcospray"

To meet the demands for a variable, all-spray nozzle, without a straight stream, a new water spray nozzle, the "Alfcospray," has been introduced by the American-LaFrance-Foamite Corporation, Elmira, New York.

From the shut-off position, a slight turn of the tip immediately gives a cone spray of 40 degrees. Further slight rotation produces increasing cones up to full curtain of 150 degrees, with reversal back to shut-off without any intervening straight stream. This model is

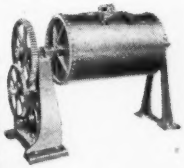

# GLOBE
*Finishing • Tumbling*
# BARRELS

**The Globe complete line of finishing tumbling barrels has had the acceptance of industry for more than 40 years.**

**GLOBE DIRECT MOTOR DRIVE, TILTING, TUMBLING BARREL.**

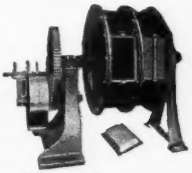
(Right)—Speeds as low as 30 r.p.m. Developed to produce fine finishes on nonferrous parts. No nicks or scratches. Quality built with compactness. Available with wood, steel or cast iron shells.

**No. 6 HORIZONTAL FOUNDRY BARREL.**



(Right) — Ruggedly constructed for heavy duty work such as removing fins and flanges from castings. Available in varied sizes with tight and loose pulleys or motor drive as shown.

**COMPARTMENT BURNISHING BARREL.**



(Right) — Performs up to three jobs at once, speeding production. Exceptionally strong and durable. Large door opening facilities loading and unloading. Belt or motor driven.

**Consult** Globe finishing specialists on each or all of your finishing problems without obligation.

**FREE!** **Globe's new illustrated catalog P-6 is yours for the asking. Packed full of interesting information, it demonstrates how you can slash your finishing costs. Write today!**

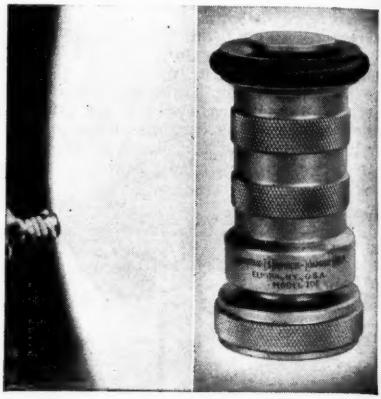
THE GLOBE MACHINE & STAMPING CO.
1200-1250 WEST 76TH STREET
CLEVELAND · OHIO

said to find favor with many public utility companies, as it prevents any possibility of a solid water stream being applied inadvertently on live electric circuits.

The varying cones are also said to be excellent for extinguishing heavy oil fires, and for general cooling purposes. The nozzle is known as Model 10F. It can be furnished for any 2½ in. hose thread, also for Underwriters' tip thread, 2 in. hose thread, or 1½ in. thread.

In the 40 degree spray position, the capacity is about 95 g.p.m. and 135 g.p.m. at 50 lbs. and 100 lbs. inlet water pressures respectively. The full curtain capacity at these pressures is approximately 170 g.p.m. and 215 g.p.m.

The Alfcospray nozzle in the full curtain position provides an effective water screen to protect men and property behind it. It is said to be more effective on Class A fires (wood, rubbish, textiles, and so on) with spray discharge, than straight bore nozzles, because the finely divided particles of water dis-



(*Left*) — Alfcospray Full Curtain. (*Right*) — Alfcospray Model 10F

charged in the form of a spray will allow absorption of a far greater amount of heat than a like quantity of water delivered in a straight stream.

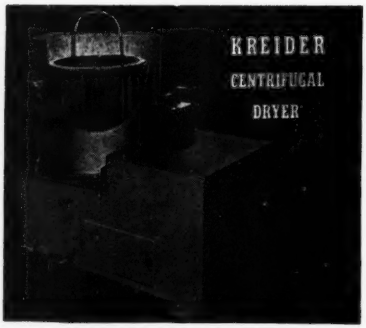
The Alfcospray will cool and protect buildings, tanks and other structures that are menaced by exposure hazard. It will knock down heavy smoke and dissipate poisonous fumes.

## Valdura Singlekote

Designated as Valdura Singlekote, a paint product which primes, seals, and finishes interior surfaces in one application has been announced by the American-Marietta Co., 43 E. Ohio St., Chicago, Ill. The material is designed for use on plaster, concrete, brick, wood, and metal. Coverage is up to 750 square feet per gallon.

Valdura Singlekote is said to combine the hiding power and economy of water-type paints with the washability, durability, and performance of oil-type coatings. The material may be applied to surfaces previously coated with cal-


**Speed Your Drying! . . . Use a**




**FOR FASTER, LOWER COST DRYING OF PLATED PARTS**

**A high speed, one-man drying outfit that will speed production and at the same time improve quality. May also be used for lacquering small parts. Sturdy all steel, electric welded construction. Fool-proof controls include foot brake and reversing drum. V-belt drive; anti-friction bearings. Auxiliary heating unit available.**

*Write for complete information and prices.*

**DELLINGER MFG. CO., 729 N. Prince St., Lancaster, Pa.**



**BETTER PLATING, LESS COST!**

"MGC" ELECTROPLATING EQUIPMENT

*Write for Interesting Details TODAY!*

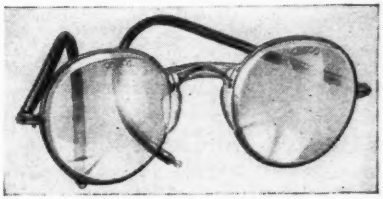
MOTOR GENERATOR CORP., HOBART SQ. Box PF-82 TROY, OHIO

cimine or casein paints, providing the old covering is bonded or tight to the wall. While it easily covers dirt, Valdura Singlekote is not recommended for use on oily or greasy surfaces. High hiding power is said to permit coverage of dark surfaces with a single coat. The material, which is self-leveling, is said to set in two hours, dry within 12 hours, and provide a dead-flat finish when viewed at a 90-deg. angle.

Valdura Singlekote is supplied packed in 1-gallon cans, 5-gallon pails, and in drums. It is available only in white but may be tinted with alkali-resistant colors in oil. Packed in a concentrated form, one gallon of Valdura Singlekote provides five quarts of paint when mixed with one quart of turpentine or mineral spirits.

## Chicago "Comfort-Bridge" Spectacle-Type Goggles

Spectacle-type goggles with "comfort-bridge" feature which is said to make the goggles easy and unusually comfortable to wear are now being marketed by the Chicago Eye Shield Co., Dept. 23, 2310 Warren Blvd., Chicago, Ill. The bridge is described as a single unit molded out of a non-combustible plastic material and having wide bearing jumbo pads which distribute the weight evenly and float the frame without undue pressure across the bridge of the wearer's nose. Designed for flexibility, both the bridge and pads are self-adjusting to varying nose widths.



Chicago "Comfort-Bridge" Spectacle-Type Goggles

The frame of the goggles is of lightweight design, yet is said to retain every element of strength. The arch bridge is high and engages the eye wires at four different points by means of forked ends, thus affording double the strength and rigidity obtained when only two points are engaged. This construction is said to entirely eliminate


**— for FILTERING all PLATING SOLUTIONS**

**EFFICIENTLY — ECONOMICALLY — with SPEED**

**BRIGHT NICKEL — COPPER — SILVER, ETC.**

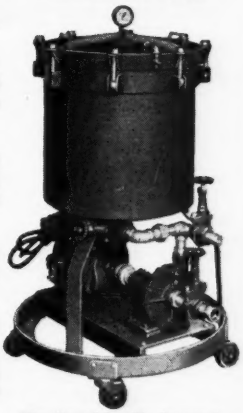
EFFICIENT—Horizontal plates are designed for maximum cooperation with modern filter aids—Intermittent filtering without disturbing cake — Quality always uniform.

ECONOMICAL—Uses less filter aid — longer filtering cycle (less labor involved). Filter paper can be used and is 1/5 the cost of disc pads generally used in other filters.

SPEED—Horizontal plates are streamlined to overcome resistance and increase flow rates. Speed is unexcelled. Capacities to 10,000 G.P.H.

**UNITS AVAILABLE FOR OILS, SOLVENTS, VARNISHES, WAXES, ETC.**

*Write for Details.*



*The Sparkler Horizontal Plate Filter*

**THE SPARKLER MFG. CO., 214 Lake St., Mundelein, Ill.**

readjustment and to minimize breakage at these vital points.

Chicago "Comfort-Bridge" Spectacle-Type Goggles are offered in three bridge widths, narrow, medium, and wide, and are furnished with 50 mm. lenses or the newer drop oval Cesco Hardened lenses which meet all government specifications. Transparent side shields and leather padded side shields are also available with all models.

## General Industrial Finishes

As a result of the many demands for industrial finishes and other protective coatings made upon the individual division of General Printing Ink Corporation, 100 Sixth Ave., New York City, by the war program, it has been decided to pool the facilities of the entire corporation into one division—General Industrial Finishes.

Mr. John F. Devine, vice-president of the corporation and general manager of the Fuchs & Lang Manufacturing Company Division, will also act as general manager of General Industrial Finishes Division. Mr. Walter A. McKim, previously director of industrial research for the Pittsburgh Plate Glass Company, will be assistant general manager.

General Industrial Finishes Division will formulate and manufacture the following products: Primers such as are used on incendiary, demolition and fragmentation bombs and on other iron and non-ferrous metals; finishes for aircraft and machinery systems for anti-aircraft gun mounts and assemblies; miscellaneous finishing materials for items ranging from ammunition boxes and powder cans to metal furniture; textile coatings; chemically resistant and sanitary can and drum liners; collapsible tube coatings; bottle cap finishes; screw cap finishes; sign finishing systems; silk screen pastes; protective clears; white background and base coats; gold lacquer, sizes and protective finishes for flat sheet work.

Although the immediate objective is to contribute to the war effort and to serve firms working on defense orders, the ultimate aim is to offer the general industrial field a complete line of quality finishes for post-war requirements.

## So-Lo Rubber Plastic Repairing Material

As a means for conserving rubber as well as maintaining production in plants producing war materials, the So-Lo Works, Cincinnati, Ohio, is now marketing a rubber plastic material which can be readily applied to conveyor belts and other vital rubber products now in service for repairing holes and worn spots, thus eliminating the need for replacing such products and at the same time enabling plants to maintain constant production.

The material, a putty-like substance, is said to contain a very small proportion of crude rubber. According to the manufacturer, an average repair made with the material on a conveyor belt or on protective clothing such as boots, gloves, and so on, contains less than one forty-eighth of an ounce of rubber.


HEAT AND ACID RESISTANT BASKETS AND CRATES

THOUSANDS OF HOUR-PROVEN USE

Every size and shape for every metal finishing and handling operation, whether the load is two ounces or two tons.

*Send blue prints and specifications. Ask for catalog.*

ROLOCK INC

1400 KINGS HIGHWAY E., FAIRFIELD, CONN.

*For a real good polishing job use*

KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

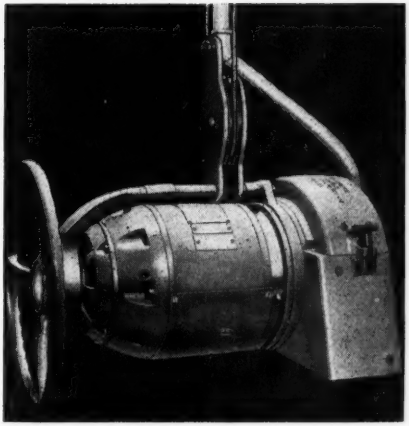
## Portable Wheelabrator

A Portable Wheelabrator for the blast room—an entirely new development in the field or airless abrasive blast cleaning—has been announced by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. Being airless, the new blast unit eliminates such equipment as air compressor motors, pressure tanks, mixing chambers, air receivers, piping, hose, valves, and nozzles.

It is claimed that the Portable Wheelabrator has been successfully applied to the cleaning of a wide range of large and small intricate, irregular shaped work such as that handled in jobbing shops or where the daily production of various parts does not warrant the use of special equipment. Typical applications would include such work as lathe beds, flywheels, gears, pulleys, valves, car wheels, frames, housings, and so on.

The Portable Wheelabrator is said to have complete flexibility of movement to any position, high or low, in any direction, and to any part of the blast room.

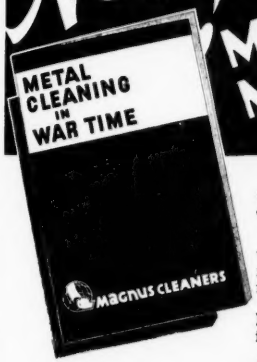
The directly connected electric motor is 2 h.p., 3 phase, 60 cycle, a.c., 3,600 r.p.m. The over-all dimensions are: length, 26 in.; diameter of motor housing, 12 in.; maximum width of Wheelabrator housing, 18 in.; diameter of handwheel, 17 in. The normal rated capacity of the unit is approximately 70 lbs. of abrasive handled per minute. The net weight of the unit is approximately 70 lbs. of abrasive handled per minute. The net weight of the unit is approximately 230 pounds.



Portable Wheelabrator


New

MACHINES METHODS and MATERIALS for WAR TIME METAL CLEANING




You want the newest and most complete data on how to clean metals faster and better—in order to avoid production bottle-necks and needless rejections.

***GET YOUR COPY OF THIS 50 PAGE MANUAL***

which tells you *how* and *why* and *when* for cleaning shells, cartridge cases, fuses, searchlight parts, mess kits and all other war munitions and materiel.

We'll gladly send a copy to any men in your plant who should know the latest developments in machines, methods and materials for metal cleaning.

**MAGNUS CHEMICAL COMPANY**

*Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.*

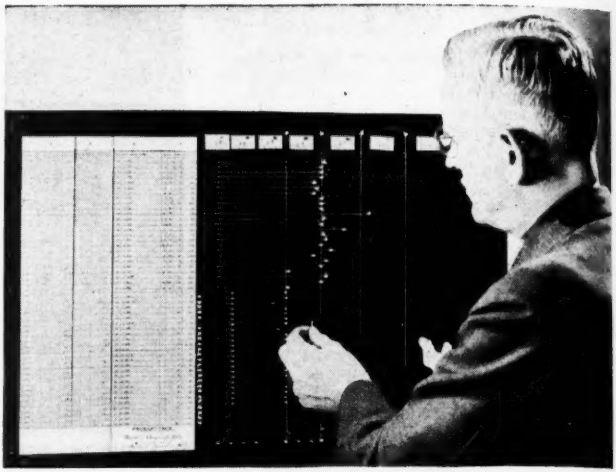
**208 South Avenue** **Garwood, N. J.**

MAGNUS CLEANERS

## "Produc-Trol"

Shown here is an ingenious device designed to provide production and purchasing executives with a quick means for observing all facts concerning raw materials, parts, assemblies, machine and man-hours. This device has been developed by the Wassell Organization, Westport, Connecticut.

The device, which is known as the "Produc - Trol," lists parts, assemblies, subassemblies, or individual operations on a part at the left of the board. Movable tapes operating from left to right on pulleys bring all pertinent facts into instant focus. Double rows of peg holes under the movable tapes and various colored pegs permit many arrangements of comparative data and control required for any operation.



"Produc-Trol"

Produc-Trol units are available in sizes to fit specific needs. Models are also available for individuals and group incentive plans.

## Paint Masters New Wrinkle Finish

Lastings Products Co., 200 S. Franklintown Rd., Baltimore, Md., has placed on the market a wrinkle finish which is said to harden in 5 to 15 minutes. This wrinkle finish for which no special apparatus is required for application is to be know nas "Paint Masters New Wrinkle Finish." It is a one-coat finish and


**BLACK-MAGIC**

**"A LOW TEMPERATURE BLACKING SALT"**

***The one-bath process***

**A Government approved process for blacking steel and iron.**

**A satisfactory substitute for many plating finishes.**

**We guarantee the same or better, color, penetration, and rustproofing than is found in any two bath process.**

**Other Black-Magic processes for Brass, Copper, and Zinc die castings.**

**The Mitchell-Bradford Chemical Co.**

**BRIDGEPORT, CONN.**



**PREPARE METAL FOR PAINTING WITH**

**SOL-KLEAN**

**INDUSTRIAL CHEMICAL PRODUCTS CO.**

**DETROIT**

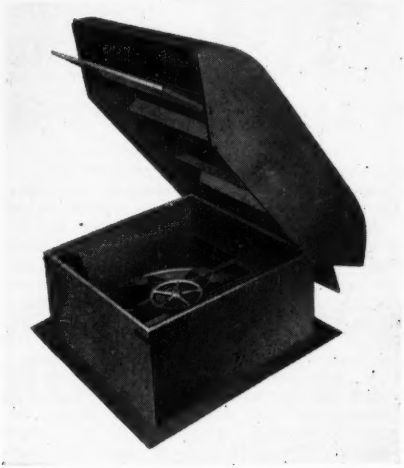
**Milwaukee** **Ft. Wayne**

is available in many colors and patterns.

This product is reported to be available without priorities and the resultant finish has high concealing power which covers imperfections, blemishes, seams, welds, flaws, and other irregularities. Application may be by brushing, spraying, dipping, or roller coating.

## Allen Type "H" Roof Fan

The Allen Type "H" Roof Fan, manufactured by The Allen Corporation, 9751 Erwin Ave., Detroit, Mich., is said to be particularly suitable in the solution



Allen Type "H" Roof Fan

of ventilation problems in blacked out plants.

An integrally built roof fan complete in every detail whose installation is accomplished by securing to the roof over an opening made to the size of the fan housing and connecting electrically. This new Type "H" Roof Fan is made in sizes 30 in. to 60 in. with a capacity range of 5,600 to 45,000 c.f.m. The V-belt driven multiple blade fan wheel has a large area requiring comparatively small motors to give these exceptional capacities.

The fan and motor are easily accessible for oiling and inspection from the roof. By merely removing the two end bolts, the hood lifts easily, as the two remaining bolts act as hinges. The hood is equipped with counterbalanced damp-


# IRCO-IZING PROCESS

If you are figuring on government work, IRCO-IZING fully meets the specifications. No expensive equipment needed. Available for immediate shipment. Write for Booklet No. 22-A fully describing IRCO-IZING.

**A CHEMICAL DIP TREATMENT FOR IRON, STEEL, ZINC AND CADMIUM PROVIDING A RUST INHIBITING BASE FOR PAINT OR A FINAL FINISH.**

5 Minute Dip for Paint Base—increases the life of the paint three to five times.

30 Minute Dip, Stain and Oil for Final Finish to replace Zinc, Cadmium, Tin and other strategic materials.

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2729 St. Louis Ave., St. Louis, Mo.
R. F. KNOX CO., INC.,
575 Marietta Ave., Atlanta, Ga.
DIXIE ELECTRO PLATING CO.,
3001 Engelke St., Houston, Texas.
GREAT LAKES PLATING & JAPANNING CO.,
1715 N. Bosworth Ave., Chicago, Ill.
SUPERIOR PLATING & RUSTPROOFING CO.,
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Minneapolis, Minn.

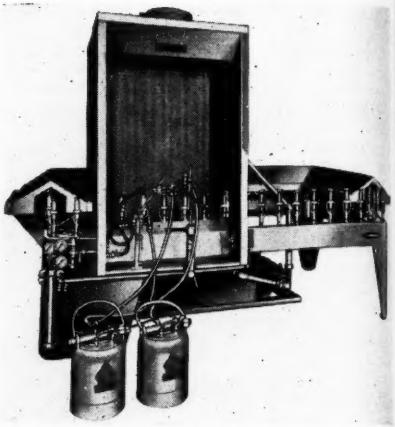
**INTERNATIONAL RUSTPROOF CORPORATION**
12507 PLOVER AVE. CLEVELAND, O.

ers which open and close automatically as the motor is turned on or shut off, thus providing controlled ventilation.

## Paasche Automatic Airpainting Unit for Coating Interiors and Exteriors of 40 mm. Shells

A streamlined airpainting unit for coating interiors and exteriors of 40 mm. shells is being manufactured by the Paasche Airbrush Company, 1910 Diversey Pkwy., Chicago, Ill., and units of this type are already in operation in many war plants. Production on a machine such as illustrated herewith is 1,920 pieces per hour with 2¼ minutes drying time. However, variable speed drives permit increase or decrease in production of drying time, and conveyors are supplied in sizes to meet any requirement.

Shells are conveyed to coating stations on revolving spindle assemblies mounted on steel roller chain and are held by combination holding and shielding fixtures. Hollow shield also protects threaded portion on interior from paint. Holding fixtures are interchangeable so shells of different sizes and types can be accommodated. Spindles, set at three-inch centers, are removable.



Paasche Automatic Airpainting Unit for Coating Interiors and Exteriors of 40 mm. Shells

Interior of shell is coated first by airbrush which is automatically oscillated, following the shell while spraying interior surfaces. This feature assures complete, uniform coverage and a maximum of savings in material. Work continues to exterior coating station and then through infra-red drying section.

A water wash exhaust booth is provided to accommodate both spraying operations and assure a maximum degree of safety. Features of this booth also eliminate the usual manual cleaning, thus saving considerable time and maintenance.

The Paasche automatic airpainting unit is complete, and includes infra-red drying unit, exhaust unit, high quality centrifugal pump with water wash booth, automatic airbrushes, water, oil and dirt separator and time-saving "Clamptight Cover" pressure feed material tanks. Frame is of heavy pressed steel, streamlined in design, and is 9 ft. 5 in. long, 4 ft. 11 in. wide, and 2 ft. 6 in. high.


*-for Fast · Finishing*

"INDIAN BRAND" POLISHING ABRASIVE

For nearly forty years we have been producers and refiners of abrasive grains, serving the industry with a strictly quality product for all particular abrasive applications. Accurately Graded — Thoroughly Cleaned — Greater Capillarity — Longer Wear.

***Send for trial lot—FREE!***

Indian Brand Polishing Abrasive
Hecco Brand American Emery

**THE HAMILTON EMERY & CORUNDUM CO.**

Chester, Massachusetts


## Cadet Protector Creme

The Cadet Creme Co., 150 Farrar Ave., Worcester, Mass., is now marketing a protective skin cream to be known as Cadet Protector Creme. Applied to workers' hands before exposure to paints, solvents, dyes, inks, tar, greases, and possible sources of dermatitis, this ma-

terial forms a protective film which is said to be impervious to these substances, yet removable merely with water. When removed, the film takes dirt with it, leaving hands clean and making strong hand cleaners unnecessary. According to the manufacturer, the cream does not remove natural skin oils.

Cadet Protector Creme is stated to be an emulsion of vegetable and animal oils and fats, and to be safe for use on any part of the body. It is supplied in six-ounce jars containing sufficient amount of cream for numerous applications.

## Wabash Blackout Bulb Unit

Important changes in Blackout bulb specifications have been announced by the Wabash Appliance Corporation, 335 Carroll St., Brooklyn, N. Y., whose silver-lined Blackout bulb placed on the market in early January was put through exhaustive blackout tests in actual city-wide blackouts in practically every State. Specification changes are based on the results of these tests, as well as on various official recommendations.

The most important specification change is in color of light blue and red to the deep orange recommended by the Office of Civilian Defense. Other changes are smaller size, reduced current consumption to 15 watts, elimination of the former built-in reflector, and improved type of heavy black silicate coating to prevent light leakage.

The deep orange light that the new

Wabash Blackout Bulb Unit

unit provides is said to be ample to permit room occupants to see each other plainly, as well as doors and windows.

## Saran Fittings

Fittings molded from Saran, the new thermoplastic, are now available for

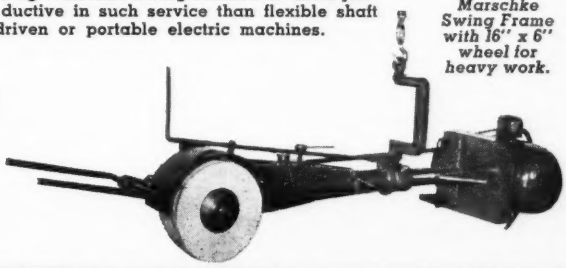

# MARSCHKE Swing Frame BUFFERS

The Marschke idea of swing frame buffing has taken hold fast in recent years, with good reason . . .

Marschke Swing Frames have proved extra fast and dependable in polishing large or awkwardly shaped surfaces such as kick plates, airplane propellers, locomotive side rods and link motions. Good maneuverability—with the *weight* and *power* to get the most out of any buffing wheel—make these smooth running Marschke Swing Frames far more productive in such service than flexible shaft driven or portable electric machines.

**Write for Catalog of bench, pedestal and swing frame Marschke Buffers to Vonnegut Moulder Corp., 1845 Madison Ave., Indianapolis, Ind.**

*Marschke Swing Frame with 16" x 6" wheel for heavy work.*



MARSCHKE
QUALITY
GRINDERS
AND
BUFFERS

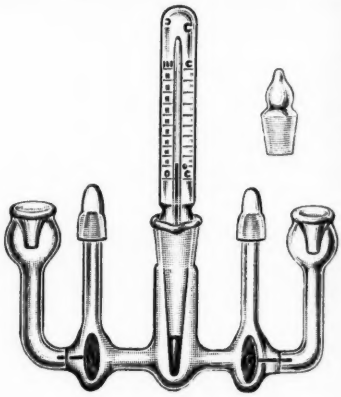
VONNEGUT MOULDER CORP. INDIANAPOLIS

tubing sizes ⅛ in. to ⅜ in. o.d. They are fabricated by the Acadia Synthetic Products Division of the Western Felt Works, 4115 Ogden Ave., Chicago, Ill. This company also processes Saran tubing, pipe, rod and sheet. By means of Saran Fittings it is said to be possible to set up a complete, chemically resistant piping system without the use of metal, thus effectively breaking the bottleneck of availability of materials for this purpose.

The fittings are said to have a high tensile and bursting strength, are noncorroding and non-aging and, being nonconductors of electricity, are able to prevent the formation of galvanic couples. They can be used with equal facility on metal tubes.

## Industrial Fill-Type Conductivity Cell

For accurate determination of conductivity of electrolytes of high conductivity, the Cel-3 Fill-Type Conductivity Cell with a constant of approximately 15 has been made available by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J. This cell is used by placing the electrolyte in the body of the cell proper, and connections are made to the conductivity bridge by means of mercury placed in the connecting bulbs on each end, with the



Industrial Fill-Type Conductivity Cell

connecting wires dipping into the mercury pools.

A thermometer is supplied to be inserted in the electrolyte for temperature readings. The accurate positioning of the electrodes in contact with the electrolyte is assured by the rigid construction employed. The cell is of resistance glass construction with platinum electrodes.

## Olive Drab Color for Carbozite Coatings

Carbozite Corp., First National Bank Bldg., Pittsburgh, Pa., announces that its standard, shop, and textile coatings are now available in a government-approved olive drab color.

Carbozite Standard Coating, which is used for protecting roofing, siding, piping, machinery, and all exposed steel work, is said to resist the corrosion of acid, alkali, moisture, sulphur water, salt air or water, smoke, and so on. It is available in Carbozite black, red oxide, green noncorrosive light and dark gray, and the new olive drab in consistencies for brushing, spraying, or dipping.

Carbozite Shop Coating, a material for shop prime-coats or product protection during shipping or storage, is a quick-drying coating which can be sprayed, brushed, or dipped and is de-

THE ADIRONDACKS GORE MOUNTAIN CRYSTAL GARNET ORE

ABRASIVE GARNET

*For*

**Abrasive Paper and Cloth**
**Grinding Wheels**
**Sand Blast**
**Minus 300 Mesh for**
**Polishing and Lapping**
**Grades for Barrel Finishing**

***Ample Stocks Insure***
***Prompt Shipment***

**BARTON MINES CORPORATION**
**NORTH CREEK, WARREN COUNTY, N. Y.**

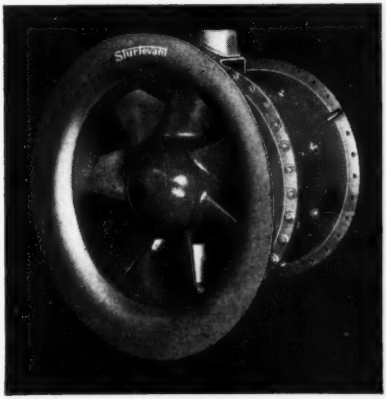
signed to protect steel, nonferrous metals, and so on, from moisture, fumes, salt air or water for long periods of exposure. According to the manufacturer, this coating is being extensively used as a primer for structural steel in the shop and for protection of bright products being shipped in open cars and overseas.

Carbozite Textile Coating is designed for use in waterproofing fabrics, tarpaulins, and so on.

## Sturtevant Victory Axiflo Fan

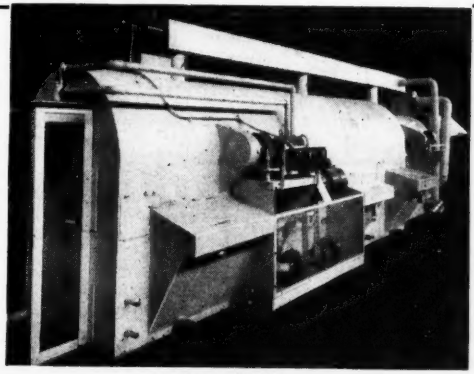
A radical innovation in axial-flow fan design has recently been announced by B. F. Sturtevant Co., 16 Damon St., Hyde Park, Boston, Mass. This new fan which bears the name "Victory Axiflo Fan" is said to possess outstanding features in performance, quiet operation and savings in weight, space and power.

For the duration of the war the use of the Victory Axiflo Fan must be restricted to the U. S. Navy, where it is now being used for heating, ventilating and mechanical draft service on battleships, cruisers, destroyers, and airplane carriers. At the conclusion of the emergency, it will be available to industry. Because of the application of the new fan for practically every type of ventilating, air-conditioning, mechanical draft and industrial application, the manufacturer anticipates that demands will




Sturtevant Victory Axiflo Fan

be extreme when the need for rigid operating economies returns with the revival of competition at the conclusion

Dept. "PF"

RANSOHOFF

N. RANSOHOFF, Inc.

Cleaning Machine Specialists

TOWNSHIP and BIG FOUR R. R., CINCINNATI, O.

TODAY— ALMOST EVERY JOB IS A CHALLENGE TO INGENUITY

IDEAL

Doing two jobs—more often twenty or fifty jobs in the time you did one before . . . that's some assignment. But America is doing it . . . and that's what will win the war. Do things faster . . . better . . . cheaper.

*Rush a wire, phone or letter to the Ransohoff Engineers, Dept. PF. They'll go to work with you and for you in jig-time.*

Metal Cleaning EQUIPMENT

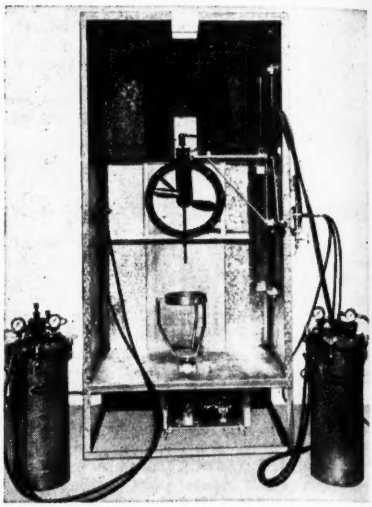
of the war. Already the makers are preparing to meet these demands.

Among the outstanding features of this fan are: Mechanical efficiency over 90 per cent; extremely quiet operation (example: a given unit produces only 80 decibels when supplying 12,000 c.f.m. at 3 in. S.P.); comparatively small size, light weight, compact; pressures range from ½ in. to 6 in. wg. for the motor-driven ventilating fan; other designs with turbine drive operate against pressures as high as 60 in wg.; high rotative speeds (motor-driven units adapted to 1160 and 1750 standard speed motors; turbine-driven units operate at speeds as high as 5,000 r.p.m.); and extremely wide ranges of sizes and volumes.

## Eclipse Spraying Unit for 8-Inch Shells

A special unit for spray coating 8-inch shells in a vertical position has been built by the Eclipse Air Brush Co., 400 Park Ave., Newark, N. J. Inside coating operations are performed by means of a semi-automatic spray gun fitted with a long extension nozzle. The outside of shells is sprayed manually by the same operator who performs the inside coating operations.

Shells are rotated by an air motored tripod with a ring at the top to protect the driving band from paint. The rate of production with the Eclipse Spraying Unit is approximately 25 shells per hour.



Eclipse Spraying Unit for 8-Inch Shells

Get Hep to This
for Polishing and Buffing!
Faster and Cheaper
ACME
SEMI-AUTOMATIC
and Lathe Combination Unit
One of the many Acme Automatics designed to speed up production and reduce production costs. Send sample for free production estimate.
ACME Manufacturing Co.
1642 HOWARD ST. • DETROIT, MICH.


## "Roxite" Cement-Asbestos Pipe

"Roxite" is the trade name of the new line of cement-asbestos pipe now being marketed by The United States Stoneware Company, Akron, Ohio. "Roxite" is manufactured by a patented high pressure process, giving it high density and great mechanical strength.

Patented "Flexlock" sleeves and fittings are used to couple Roxite Pipe, no special tools being necessary for assembling. The "Flexrock" method of coupling does away with the need for any special treatment or threading of the pipe ends.

Standard Roxite Pipe is specially designed for the handling of a wide range of mildly corrosive solutions, for transporting processing water which must be kept free of metallic contamination, and so on. The corrosion resistance of Roxite Pipe also makes its use most economical for handling fumes and gases in ventilating ducts and stacks, by reducing maintenance costs and replacements to a minimum.

For more severe duty, Roxite Pipe is also available with an impregnated or synthetic coating which offers adequate protection for many types of highly corrosive conditions. A unique process of impregnating or coating Roxite Piping thus brings to the field of corrosion-resistant materials of construction a new and inexpensive method of handling many processing and chemical solutions.

Several types of synthetic-resin protection are offered with Roxite Pipe, each of which is suitable for a particular range of service, both in respect to the fluid to be handled and the mechanical severity of the operating conditions. The manufacturer's standard coating consists of an internal and external synthetic resin finish having a thickness of about $\frac{1}{64}$ in. This coating is said to be extremely tough and durable and insures adequate protection for a great many corrosive conditions, including resistance to virtually all non-oxidizing acids.

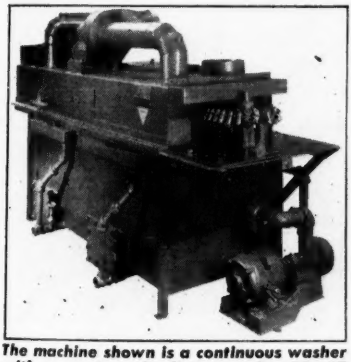
Roxite Pipe can also be lined with "Tygon" Corrosion Resistant Lining Material, having an effective thickness of about $\frac{1}{8}$ in. This lining thickness offers high resistance to abrasion along with immunity against almost all corrosive chemicals, with the exception of glacial acetic, concentrated sulfuric and chlorinated solvents. When Roxite Pipe is thus lined with Tygon, it is made to possess virtually all of the advantages of Tygon-Lined metal pipe. However, standard unlined Roxite Pipe in itself is quite resistant to many corrosive fumes and gases that are encountered in chemical and process plants. Such fumes often attack metal-lined pipe externally and not infrequently will then cause a pipe line to fail from the outside in.

All Roxite Pipe, including the coated and Tygon-Lined types, are available in any length up to 14 ft. and all sizes from $\frac{3}{4}$ in. up to and including 8 in. i.d. On special order, 10 in. and 12 in. i.d. sizes can also be secured. A complete line of standard fittings is available, including Ells, Tees, Y's, Crosses, Adapters, and so on. Standard pipe lengths are easily cut in the field to any desired size with a simple abrasive saw arrangement. All Roxite Pipe, when de-aired, is satisfactory for working pressures up to 150 lbs. per sq. inch.

## Steel-Grip Triplex Guard

Since the Steel-Grip individual Finger Guard was introduced by Industrial


# TAKE THE SLOW SIGN *OFF* YOUR PRODUCTION LINE



*The machine shown is a continuous washer with an automatic discharge for 20, 37 and 40 MM projectiles.*

**Costly time consuming hand operations can be eliminated in your production work by the use of the overhead monorail type conveyor and Blakeslee Metal Parts Washing Equipment. You can take the SLOW sign off your production line and speed up machining and finishing operations by quickly and thoroughly cleaning stampings, castings, metal assemblies and all screw machine products with Blakeslee engineered-for-you equipment. Write today for full details on Blakeslee's Metal Parts Washing Machines and Solvent Degreasing Equipment. *Write or wire for rush quotations on any war defense contract requirements.***

**G. S. BLAKESLEE & CO.**

**NEW YORK • CHICAGO • TORONTO, ONT.**

Gloves Company, 722 Danville, Ill., several months ago, this company has had

Steel-Grip Triplex Guard

a steady demand to re-design and incorporate this popular and efficient type of protector for the thumb and first two fingers into a single unit.

The result is shown in the accompanying illustration—worked out with a mirror so that the construction of the back, as well as the palm side of the guard is readily seen.

This new guard is designed for punch press work, buffing, grinding, sorting, assembly, inspection, and so on, for all jobs where protection is needed only on thumb and first two fingers.

In the illustration the guard is shown made of wool felt—material best suited for handling greasy or oily parts, or as protection against heat in the handling of hot dies, molds, parts, and so on. The guard may be had also in chrome leather. In both types, the back is made of elastic webbing which assures the wearer of cool, comfortable fit. Like all other Steel-Grip gloves, mitts or hand guards, the new Steel-Grip Triplex Guard can be purchased as pairs, all rights, all lefts, or any combination of rights and lefts as needed at no additional cost.


**1-9-4-?**

Some year the war will end.
Swords will be beaten back into plowshares, and golf clubs and refrigerators.
There will be a swing back into the things we buy because we like them and not because they are a grim necessity.
You are planning these things now, or should be.
Let us plan with you toward the finish for 194?, whenever it is.
We welcome any call for co-operation on long-range planning for the finish of the future.
Meantime, for 1942 and as far as we can see, we shall do our utmost to supply our customers with the best available materials and service permitted by wartime conditions.

**The Varnish Products Co.**
**5208 Harvard Ave. Cleveland, Ohio**


## Westinghouse Incandescent Luminaire for High or Low Bay Areas

Especially adapted for extreme service locations, such as steel mills, foundries, chemical plants or wherever acid fumes, dust, smoke or excessive moisture is present, a new vapor-tight Millite luminaire for incandescent or mercury lamps is announced by the Westinghouse Lighting Division, Cleveland,

Westinghouse Incandescent Luminaire for High or Low Bay Areas

Ohio. Because of its weather-proof construction, the unit can be used satisfactorily for outdoor applications.

Consisting of three parts, a porcelain enameled steel reflector available in several sizes, a socket assembly, and a hinged glass cover, the unit is arranged for conduit mounting. Reflectors for 300 and 500 watt sizes are made from 19 gauge iron sheet, and the 400, 750, and 1000 watt sizes are from 18 gauge.

Vapor-tight sealing is obtained with a heavy, treated asbestos gasket between cover and housing. An impact-resisting glass lens ¼ in. thick is designed to withstand sharp temperature changes and if broken, shatters into small dull fragments rather than splitting into large pieces.

## "Ply-Rustex" Rust Prevention Cream

The Milburn Co., Detroit, Mich, is now marketing a rust prevention material in the form of a cream which can be applied to the hands of a workman before contact with highly polished metal surfaces. The material, which is known as "Ply-Rustex," is designed to eliminate perspiration corrosion and other forms of rusting caused by the handling of metals during machining and processing operations.

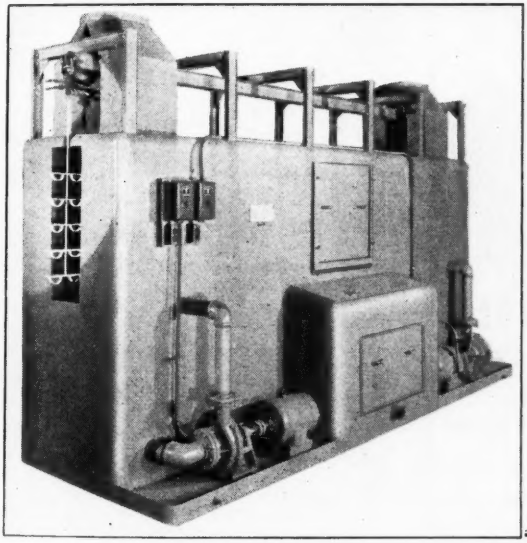
With Ply-Rustex, the worker applies the cream to his hands before touching any part of the article to be machined or processed. This enables the worker to freely handle the metal part throughout the machining operation without gloves, since Ply-Rustex forms an invisible film on the skin which is said to be inert with respect to chemicals, oils, cutting compounds, and other materials that may be a part of the particular industrial process.

According to the manufacturer, Ply-Rustex is non-toxic and positively harmless to the skin. It can be easily applied similar to a vanishing cream and removed with equal facility. Moreover, since it forms an impervious protective coating, the material is said to prevent irritations that may result in many forms of industrial skin disorders or dermatoses.

## Richards-Wilcox Chain-Type Conveyor

Of interest to many manufacturers now engaged in war production is a new


**PRODUCTION PLUS . . .**



More production now means victory sooner. Howard equipment, such as the Monorail Wash and Rinse Machine shown, is at work night and day throughout the land making "Bundles for Berlin and Tokyo." Note the conveyor chain and trolley arrangement that protects vital parts of the conveyor.

Our engineers, without obligation, will gladly submit details of metal cleaning and finishing machinery to solve your present problem with an eye to the future as well.

*Illustrated catalog on request. Write to:*

**Howard Eng. & Mfg. Co.**

**1056 Hulbert Cincinnati, Ohio**

conveyor system recently introduced by the Richards - Wilcox Manufacturing Company, Aurora, Illinois.

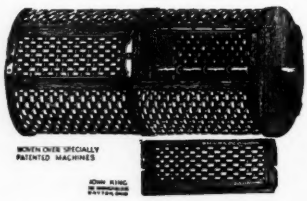
This new conveyor consists of a steel tubular track in which is a continuous chain made up of a series of vertical and horizontal wheel units. The vertical wheels are connected by an axle through the side plates of the unit frame. The horizontal unit is made of a wheel and link, the wheel bearing on the inside of the track when rolling around a horizontal curve. The vertical wheel units carry the load, ride the bottom of the truck on horizontal runs, roll under the top of the track on vertical curves, turning upward or straightening out from downward to horizontal movement. The two sets of wheels keep the chain assembly in the center line of the track. A 2-ft. radius is standard construction. The conveyor will handle 65 lb. per foot of length in single suspension, 125 lb. with double suspension.

The wheels are on 6-in. centers with vertical and horizontal units connected by pins and hardened bushings. The design approximates that of a double universal joint equipped with wheels. The load is carried on pendants under each vertical unit. No sprockets are required at the curves and forward movement is by a drive unit mounted in convenient location at any point in the closed circuit. This drive consists of a continuous tractor-type chain with fingers to engage the conveyor chain through a slot in the track. The drive equipment with its standard motor, reduction gears and shear pin is available for variable or constant speed. It assembles on a plate to which a slotted section of the track is attached. It suspends from four bolts and is connected into the track circuit by special joint brackets at each end of its track section.


IN TIMES OF NEED

INVESTIGATE

KING



PLATING BARRELS

SIZES FOR ANY EQUIPMENT

Write for illustrated folder.

*Use them once—you'll use them always*

JOHN KING

48 SPRINGFIELD ST. DAYTON, OHIO


## Binks Adapter for Standard Paint Cans

A can adapted for standard paint cans has been placed on the market by Binks Manufacturing Company, 3114 - 40 Carroll Ave., Chicago, Illinois. The Binks Adapter fits onto the standard cup attachment for spray guns, and lends itself for use with any standard type paint can. By using the Binks Can Adapter, the original paint can can be used as a spray gun cup. By this method, changes from color to color can be made quickly and without the trouble of washing the cup each time. The Binks adapter for standard paint cans is manufactured from the best materials obtainable and designed to operate with precision like accuracy.

Binks Adapter for Standard Paint Cans

(1) Indicates Tightening Clamps; both clamps should be engaged partially and then tightened.
(2) Thiokol Gasket for seal-tight fit.
(3) Ears on adapter to fit into openings on yoke of standard spray gun attachments.

**Aircraft Engine & Metal Finishes.** By Myron A. Coler. The Pitman Publishing Corporation, 2 W. 45th St., New York City. This book provides a brief description of current American practices employed in finishing the exterior surfaces of aircraft engines and similar parts. It is intended primarily for the reader who is confronted with real problems, but who possesses little or no technical

knowledge of finishing procedures; hence, much of the text is devoted to an elementary discussion of the principles on which these procedures are based. Particular attention is paid to organic finishes because of their importance and because of the need for selected, systematic information with special reference to engine-finishing problems.

Although attention is focused on aircraft-engine-finishing work in order to provide the detailed picture which is so essential for a practical understanding, the major conclusions are naturally applicable to all types of closely related metal-finishing problems. Other internal-combustion engines—such as those used on motorcycles and trucks, in marine service and on pumps, electric motors and the like—require fundamentally similar finishing procedures, to the extent that similar performance requirements must be satisfied.

The price of Aircraft Engine & Metal Finishes is $1.50 per copy.

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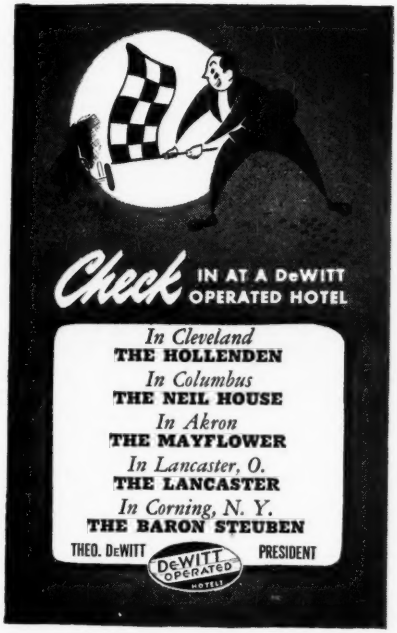
Our soldiers, sailors, and marines need planes, ships, tanks, ammunition, uniforms, and food. You can help to supply them by buying War Savings Bonds and Stamps.



# Opportunity Section

## SALESMEN WANTED

Large chemical company seeks industrial salesmen for metal cleaning chemicals in large industrial cities. Positions open are immediate, salaried and permanent.

Industrial sales experience and knowledge of metal working operations essential. Actual experience in metal cleaning field not necessary.

Applicants must own car in good condition, and be draft-deferred. Traveling expenses will be paid.

Positions offer liberal starting salaries and substantial future. Send snapshot and give details of personal history and business experience, including earnings.

Our employees know of this advertisement. All replies will be treated confidentially. Write PRODUCTS FINISHING, 431 Main St., Box 101, Cincinnati, Ohio.

## FOR SALE

Zinc Electro Plating Equipment complete layout for general light Zin-o-lyte plating including chandeysson 750 amperes, 6 volt motor generator set. Pickling, rinse and plating tank and large supply of necessary operating materials.

**LARKIN PACKER CO., INC.**
**6200 Maple Ave. St. Louis, Mo.**

**This Opportunity Section is available for classified advertisements featuring equipment, employment, business opportunities, etc., in the industries devoted to the cleaning, plating, polishing and finishing of metals. For advertising rates and other information address:**

**PRODUCTS FINISHING**
**431 MAIN STREET, CINCINNATI, OHIO**

# FOR YOUR Catalog LIBRARY

*To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.*

**1. Good Lighting—A Production Weapon**

An 8-page folder showing how good lighting is aiding in fighting the war is now being issued by The Fostoria Pressed Steel Corporation, Fostoria, Ohio.

**2. Allen Type "H" Roof Fan**

A four-page catalog telling how ventilation costs can be cut is now being issued by The Allen Corporation, 9751 Erwin Ave., Detroit, Michigan.

**3. Sturtevant Victory Axiflo Fan**

The B. F. Sturtevant Company, 16 Damon St., Hyde Park, Boston, Mass., is now issuing a beautifully illustrated eight-page catalog describing Axiflo Fans.

**4. U. S. Stoneware Bulletin "D"**

A summarization of all the manufacturing activities in the ceramic, synthetic, and alloy industries is contained in Bulletin "D" now being issued by U. S. Stoneware Co., Akron, Ohio.

**5. Chemical Paint for Heated Metals**

A chemical paint known as Kemick that stays put on heated metals is described in a folder which is now being issued by American Chemical Paint Company, Ambler, Pennsylvania.

**6. Curran Naphtha Substitute**

The Curran Corporation, 6 Pleasant St., Malden, Mass., is now issuing a data sheet on Naphtha Substitute, explaining the properties and application of this cleaning material.

**7. General Industrial Protective Coatings**

General Industrial Finishes, 100 Sixth Ave., New York City, is now issuing a beautifully illustrated 16-page catalog describing protective metal coatings.

**8. The Tocol Line**

Protective Coatings Incorporated, 10391 Northlawn, Detroit, Mich., is now issuing a folder of data sheets containing valuable information on coating materials.

**9. Rolock Wire Mesh Baskets**

Construction specifications and applications of Rolock Wire Mesh Baskets are contained in a 12-page catalog which is now being issued by Rolock, Incorporated, 1350 Kings Highway East, Fairfield, Connecticut.

**10. Metal Cleaning in War Time**
The Magnus Chemical Company, Inc., 208 South Ave., Garwood, N. J., manufacturer of industrial cleaning materials, emulsifying agents and metal working lubricants, is now issuing this new 50-page, illustrated handbook.

**11. Metal Parts Cleaning Equipment**
Colt Autosan Metal Parts Cleaning Equipment is described in a 12-page catalog now being issued by Colt's Patent Fire Arms Mfg. Company, 1933 Van Dyke Ave., Hartford, Connecticut.

**12. Brightboy for Polishing and Finishing**
An eight-page booklet describing Brightboy; what it is, what it does, is now being issued by Brightboy Industrial Division, Weldon Roberts Rubber Co., 351 Sixth Ave., Newark, New Jersey.

**13. Lixol Metal Cleaner**
A solvent emulsion-type metal cleaner known as "Lixol" is described in a booklet which is now being issued by Cowles Detergent Company, 7016 Euclid Ave., Cleveland, Ohio.

**14. Metal Cleaning with DuBois Products**
Various methods of metal cleaning such as solvent, soaker tank, mechanical washing machines, and electrolytic cleaning are described in a bulletin now being issued by The DuBois Company, 1120 W. Front St., Cincinnati, Ohio.

**15. Spray Booth Cleaning Compounds**
Triad WS and WSF spray booth cleaners for use respectively in booths where oil base paints and enamels are sprayed are described in a new leaflet issued by Detroit Rex Products Company, 13017 Hillview Ave., Detroit, Michigan.

**16. Sarco Temperature Regulators**
Bulletin No. 600 which is now being issued by Sarco Company, Inc., 475 Fifth Ave., New York City, illustrates and describes Sarco Temperature Regulators for heat control in industry.

**17. Prep Products**
Four materials which help to provide a firm and lasting bond between all kinds of metal surfaces and paint finishes—known as Galvaprep, Prepwash, Preprite, and Metalprep—are described in a folder now being issued by Neilson Chemical Co., 6564 Benson St., Detroit, Michigan.

**18. Heil Process Equipment**
The construction of process equipment with chemical resistant materials is described in a catalog now being issued by Heil & Company, 12903 Elmwood Ave., Cleveland, Ohio.

**19. High Pressure**
A new house organ containing a review of recent developments in fire protection and in the handling of compressed gases is now being published by Walter Kidde & Company, Inc., 631 West St., Bloomfield, New Jersey.

**20. Hard Chromium Plating**
A 16-page data bulletin summarizing the applications of industrial chromium plating is now being issued by United Chromium, Inc., 51 East 42nd St., New York City.

**21. Data on Production Facilities**
The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio, is now issuing a catalog containing an abundance of information on the facilities of this company which are available to those who require sheet metal fabrication.

**22. Burring With the Lea Method**
An eight-page bulletin covering the Lea method of burring is now being distributed by Lea Manufacturing Co., 22 Cherry St., Waterbury, Connecticut.

**23. Despatch Laboratory Ovens**
Bulletin No. 105, now being issued by Despatch Ovens Company, 722 Central Ave., Minneapolis, Minn., describes fully a new line of Despatch Chemical Laboratory Forced Draft Ovens.

**PRODUCTS FINISHING**
**431 Main St., Cincinnati, Ohio**

**I am interested in receiving the following literature reviewed in your August issue.**

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*(Insert numbers denoting literature you want.)*

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City ..... State.....

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